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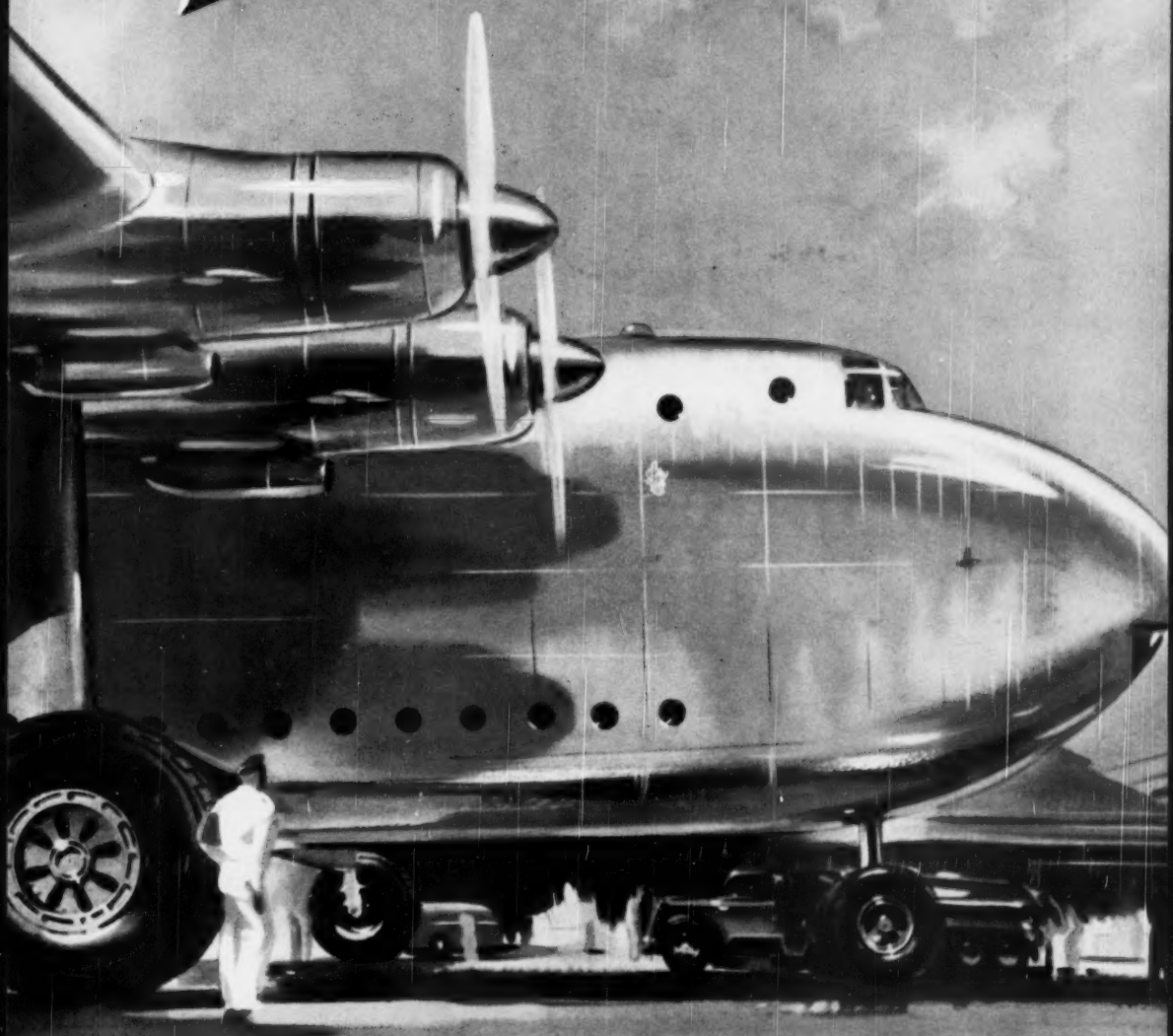

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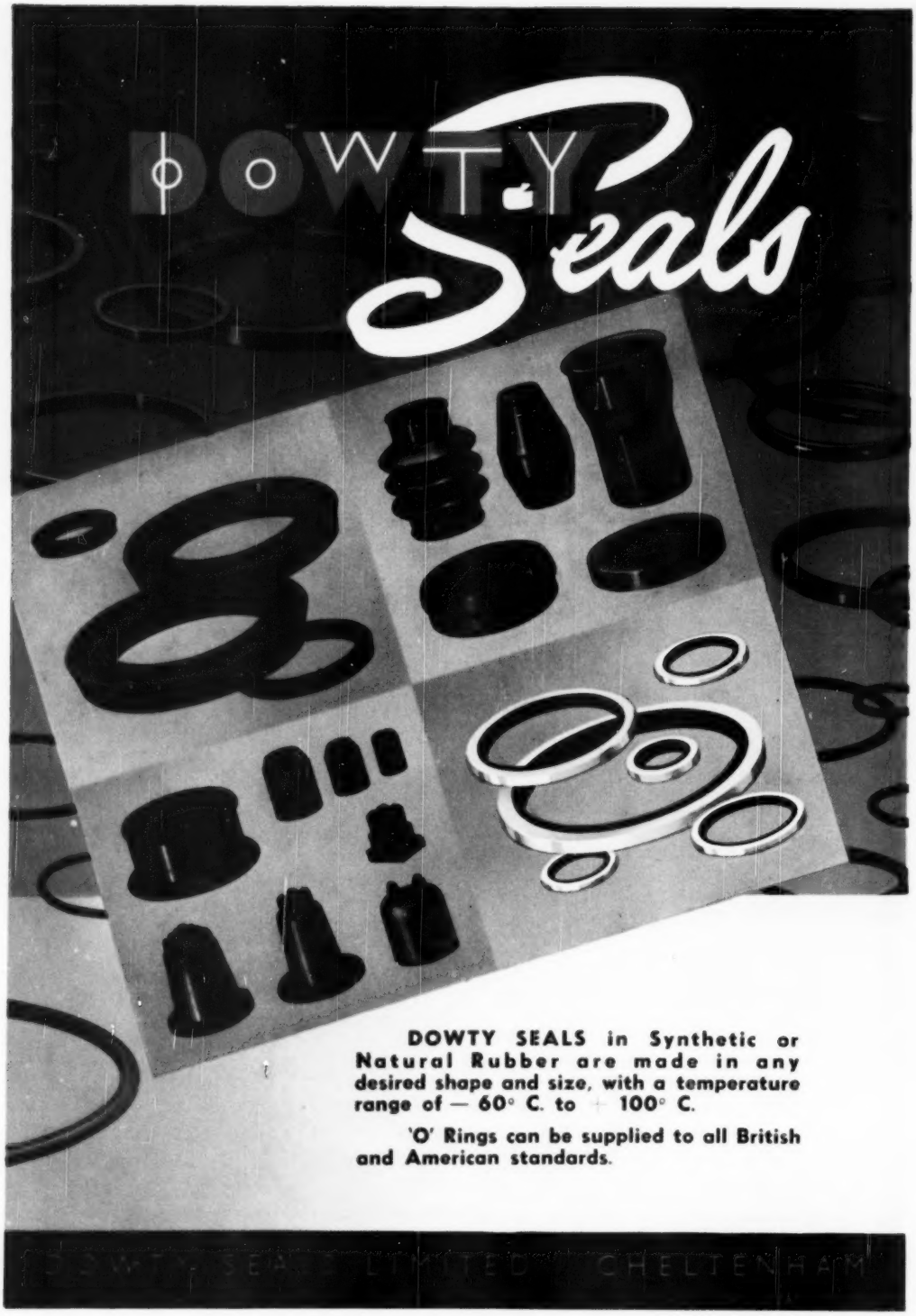

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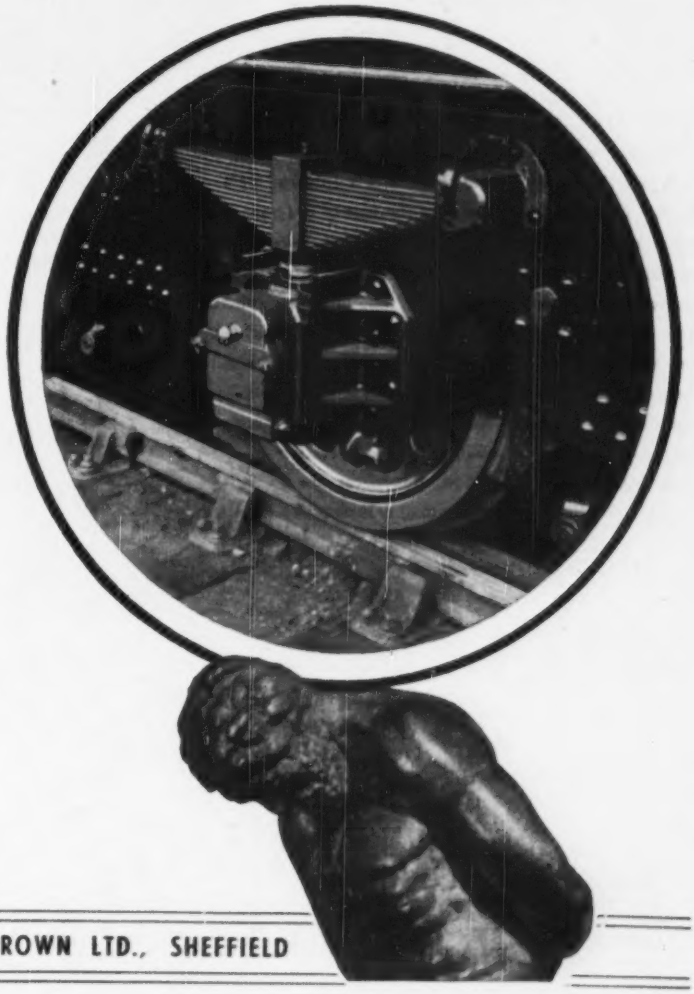

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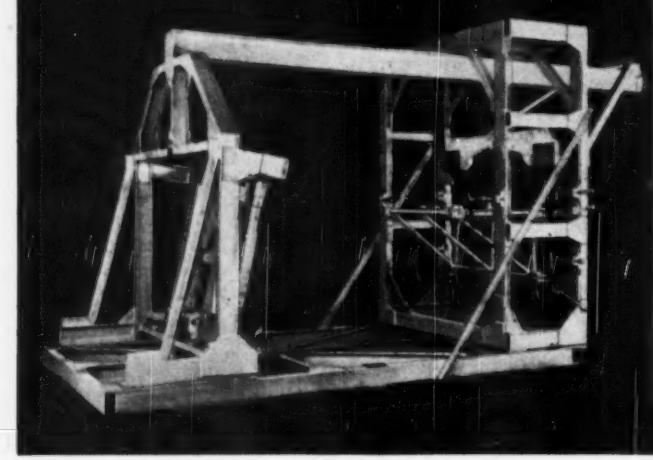

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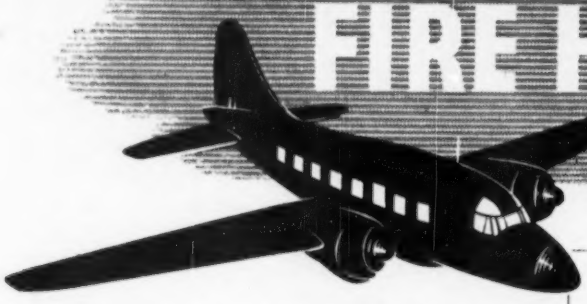

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In this issue:

Air Racing *in* Wales - - 210

Fighter Armament - - 215

Canberra - - - - - 220

Elephantasia - - - - 222

Post-War Air Racing - 229

Learning the Hard Way

TO the air staffs of Germany and Italy the Spanish Civil War was a providential opportunity for testing new equipment, much of which, in developed form, was later to be matched against the Allies' best. In Korea to-day the tacticians and technicians of the United Nations forces are keeping a watching brief on air *materiel* now being pitted, under handicaps of terrain and climate, against resolute and well-supplied ground forces.

By comparison with the Spanish campaign, however, an important difference is discerned—that in quantity and modernity the aircraft employed by the opposing forces are distinctly unequal. While the North Koreans are using Yak piston-engined fighter/bombers, obsolescent by United Nations standards (and available, it seems, only in preciously small numbers) the American and Commonwealth forces have more adequate quantities of machines such as Mustangs, which, though tactically comparable, are technically superior. As more than once intimated in this journal, the majority of Russian fighters, other than jets, are chiefly notable for their mediocrity, while the merits of the Mustang as a general-purpose fighter and long-range close-support weapon are appreciated the world over.

In the R.A.F. and Royal Navy, Spitfires and Seafires remain for duties similar to those being so ably discharged by Mustangs and other "old-fashioned" types, and while it is desirable that Spitfires should quickly be superseded by Vampires or later close-support machines, the assertion that, for present-day warfare, even the latest marks of the "Spit" are useless, is quite unfounded. What is, however, seriously disquieting is a passage from a recent R.A.F. citation, revealing that "in Malaya the Spitfire 18s of No. 60 Squadron are obsolescent and many of them are old and have deteriorated considerably." Serviceability is paramount in Korea as in Malaya and, while the candour of the Air Ministry in admitting its deficiencies is to be commended, no effort must be spared to stop the rot underlying this dismal revelation.

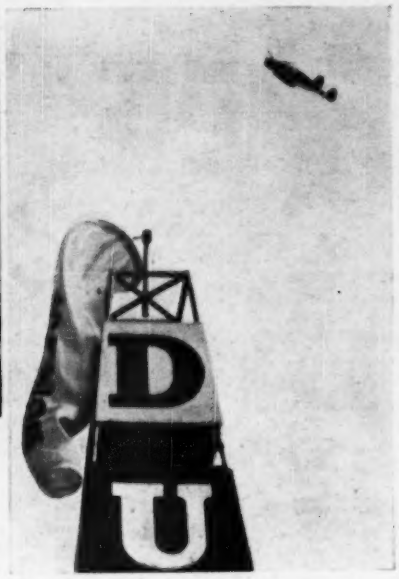
To support its piston-engined fighter/bomber elements the U.S.A.F. wisely drafted a substantial force of Lockheed F-80 Shooting Star jets to Korea in the early stages of the conflict—wisely, not only by reason of the F-80's ability to counter possible jet opposition, but because this aircraft (uninformed opinion notwithstanding) has proved a truly effective close-support weapon. But though the F-80 is acquitting itself with distinction in Korea, the U.S.A.F. has not foreseen the manifold difficulties inseparable from the operation of such types in a hard-fought overseas campaign. That improvization and *ad hoc* methods obtain equally in the U.S.A.F. as in the R.A.F. is borne out by a masterly review of F-80 operations by Mr. A. W. Jessup of *Aviation Week*, an abstract of which appeared in these pages a week ago.

We have already remarked on the analogy between the Spanish and Korean wars. It will be remembered that in Spain the Germans and Italians failed to appreciate the inadequacy of their light, axially restricted, bomber armament and that later they paid a high price for their improvidence in this regard. To-day, lessons in ground support are daily being taught us in the hard Korean school, and it is vitally important that these should be marked, learned and digested, so that future close-support aircraft should have the required performance, hitting-power and serviceability.

In the past few days American and South Korean forces have been supported not only by tactical aircraft but by strong formations of B-29 bombers. These operations were not, as claimed by some observers, without precedent, but it must be admitted that much remains to be learned about the application of so-called "strategic" air power to ground operations.

Though in the application of air power the Korean campaign is a salutary "refresher course" for U.N.O. forces, the North Koreans are also being taught some sharp lessons—notably that, in terms of manpower and air power, one and one do not necessarily equal two.

First and second places in the Kemsley Trophy Race were taken, respectively, by F. Dunkerley (right) and I. A. Forbes. On the right, the winning Gemini.



AIR RACING IN WALES

Kemsley Trophy Race and a Flying Display Held at Fairwood Common, Swansea

(Illustrated by "Flight" photographs)

A BACKGROUND of grey, cloudcapped mountains, a cold, salty wind and the overwhelming cheerfulness of the large crowd of spectators lent a characteristically Welsh atmosphere to the "grand air pageant" organized by the Swansea and District Flying Club last Saturday, August 19th. The programme included the annual international air race for the Kemsley Challenge Trophy. Fairwood Common, formerly used by the R.A.F., was the venue, and a more suitable airfield would be difficult to find. Its three black, tarmac runways and large flying control building stand out well against the all-prevailing green of the Welsh countryside—a great facility for visiting and demonstrating pilots, and at the same time, with its "Service" air, a reminder of the potential national value of the club flying movement.

After the meeting had been declared open by Lady Whitten-Brown, flying began in earnest at 2.30 p.m. with a grand fly-past of visiting aircraft. Having fully enjoyed 15 minutes of this aerial merry-go-round, the guest pilots gave way to Auster's Ranald Porteous, who delighted the audience with his demonstration of "one-point landings" in two or three directions at the same time—this normally followed by a startling climb and some very polished aerobatics.

In complete contrast to Porteous' tight circles in both the vertical and horizontal plane were the sky-consuming manœuvres of a Meteor 7 and Vampire 3 from No. 614 Squadron (County of Glamorgan) R.Aux.A.F., based at nearby Llandow. The "local boys" gave a versatile performance in spite of the relatively low cloud. This was followed by what inevitably proves to be the highlight of any programme on which the event is billed—a brilliant display of airmanship and skill by the celebrated Patrouille D'Etampes. The performance of the Stampe biplanes on this occasion was particularly fine in view of the strong wind which sometimes gusted to about 20 knots. A breath-taking hunt in formation, and Commandant Perrier's inverted flying some 20ft above the runway, brought gasps of admiration from the crowd. On landing, the four French pilots were besieged by autograph-hunters and were seen to be still hard at work with pen and programmes over an hour later.

An exhibition of exit positions used for parachuting was given by Major Terence ("Dumbo") Willans, followed by type demonstrations of the pre-war Cierva C.30 Autogiro and of the Chrislea Skyjeep, flown by Guy Baker and Donald Lowry respectively. By this time the entrants for the Kemsley Trophy Race had taken up their starting positions and as soon the the Skyjeep had landed the first competitor was away.

Most of the aircraft competing for the Kemsley Challenge Trophy had already shown their form at earlier events in this year's series of National Air Races, so it seemed reasonable to expect a close, accurately handicapped finish. Also, the race was flown round three 27.66-mile laps of a seven-sided course virtually super-imposed on the coastline of the Gower Peninsula, so that navigation was greatly simplified.

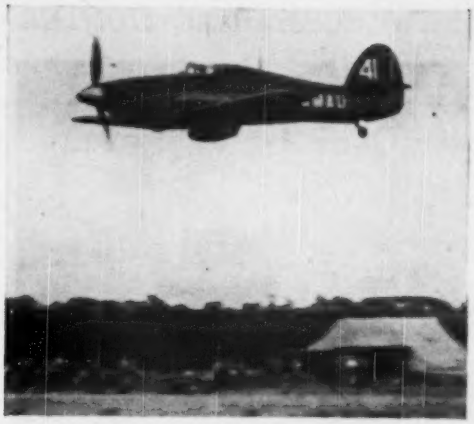
Once again, however, the unexpected happened: the Trophy was won in runaway fashion reminiscent of Somers' victory in the 1949 King's Cup Race.

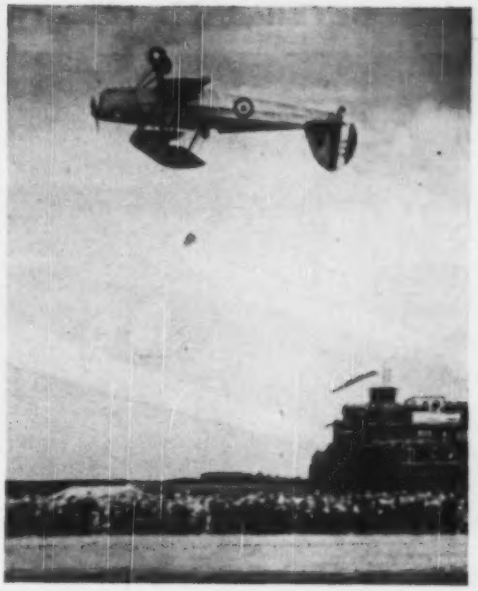
Visibility was good but there was a strong gusty wind when—just before 4.30 p.m.—the first competitor took off. This was D. C. Jemmett, flying his familiar cream-finished Hawk Trainer. Dunkerley's glistening Gemini followed the Hawk Trainer as it disappeared over the green slopes outlying the northern border of the field, and the one and only remaining Miles Nighthawk, flown by J. Forbes, took off about a minute later. Similar intervals separated the Nighthawk, Lashbrook's well-tuned blue Proctor, Somers'

KEMSLEY CHALLENGE TROPHY RESULTS

Pos.	Start Order	Competitor, aircraft and engine.	Handicap m.	Handicap s.	Speed m.p.h.
1	2	F. Dunkerley (Gemini Ia, Cirrus Min. II)	4	25	162.5
2	3	I. A. Forbes (Nighthawk, Gipsy Six II)	5	37	162
3	7	N. F. Duke (Hurricane 2c, Merlin 20)	20	8	295
4	5	J. N. Somers (Gemini III, G. Maj. Ic)	7	26	169.5
5	6	C. G. Alington (Sparrowhawk, G. Maj. Ic)	8	11	172.5
6	4	W. I. Lashbrook (Proctor I, G. Queen II)	6	33	163
—	1	D. C. Jemmett (Hawk Tr III, G. Maj. I) *	—	—	—

* Forced-landed on last lap.





(Above) Beautifully flown by Neville Duke, the last Hurricane took third place at 295 m.p.h. Commandant Perrier's individualist Stampe (right) flies past in characteristic attitude.

Gipsy-powered Gemini and the dainty cream-and-red Sparrowhawk of Geoffrey Alington.

Neville Duke's royal blue Hurricane, *The Last of The Many* (Princess Margaret's entry for the King's Cup) was still waiting on the runway when the other six competitors completed their first lap—still in order of take-off. Jemmett's Hawk Trainer fell back in the second lap and Dunkerley moved in to lead the field as the last lap began. The Hurricane, with a smoky black trail hinting at high boost pressures, began its second circuit at this point; it overhauled the Hawk Trainer just before the pylon, which it negotiated in exemplary style. The other aircraft made their second appearance—again in order of take-off—and a second impressive cornering by the Hurricane introduced the period of final speculation, for the winner would now be the first to appear.

At five o'clock, eyes were strained to identify the solitary speck coming in low from the south-west. It proved to be Dunkerley's Gemini—an unchallenged winner. After a surprisingly long interval the Nighthawk, Hurricane and Gipsy-Gemini, in orderly sequence, took second, third and fourth places. Shortly afterwards, the Sparrowhawk and Proctor hurried across the field and the non-arrival of Jemmett's Hawk Trainer was satisfactorily explained by the news that it had forced-landed on Rhossili Beach.

Dunkerley—a particularly deserving winner, since he has been a keen but unwinning competitor at several meetings this year—reported a smooth, uneventful ride and perfect performance by his hard-working Cirrus engines. His Gemini—as always—was beautifully polished, faired and taped-up, but there was no visual evidence as to how he had increased his King's Cup speed of 158.5 m.p.h., remarkable in itself, by 4 m.p.h.—and the pilot himself (perhaps with an eye to future races) maintained a canny silence. Neville Duke, incidentally, added 12 m.p.h. to the "Wolverhampton" speed of his Hurricane, but to no avail.

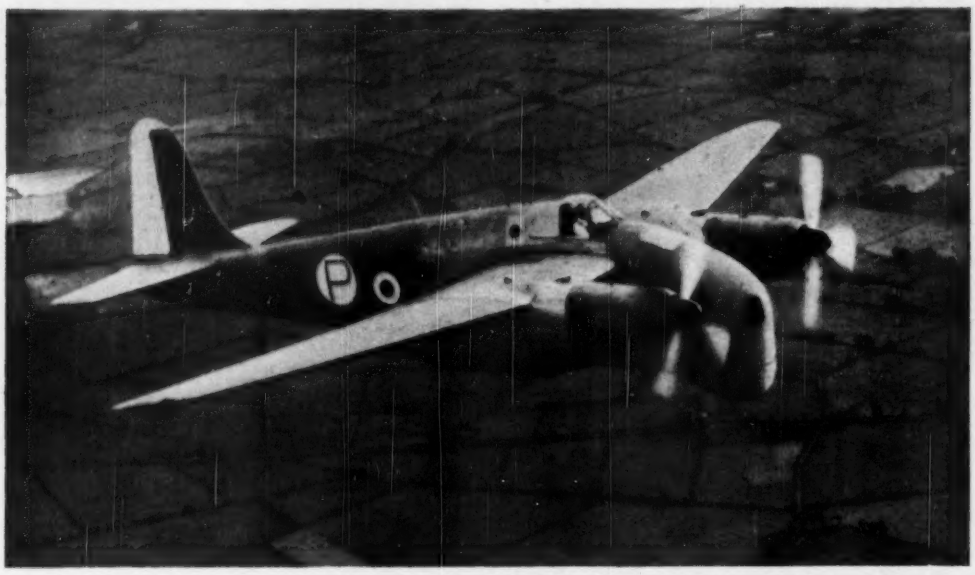
Immediately after the race the Apex Group of three parachutists baled out of a Rapide at about 2,000ft and by superb judgment and hard shroud-pulling contrived to make a soft landing on one of the few grass areas on the airfield.

The flying display programme, painstakingly organized by Mr. John Fricker, ended in fitting style with "Dumbo" Willans' solo jump from a Magister.

Trophies and prizes were presented by Mr. D. Martin Evans-Bevan, the president of the meeting.

Lift and drag: Guy Baker (right) in the veteran Cierva C.30 autogiro, and (below) Ranald Porteous caresses the ground with one wheel of his Autocrat's Goodyear castering undercarriage.

WITH DETERMINED CHIN : A NEW SUBMARINE HUNTER

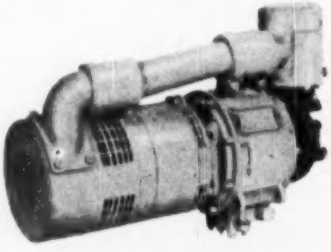


Directly descended from the Sturgeon, already in quantity production for the Royal Navy, and deriving its power from two Armstrong Siddeley Mamba turboprops, the new S.B.3 carrier-borne anti-submarine search and strike aircraft, seen on its first flight, is the latest product of Short Brothers and Harland, Ltd. That handsome is as handsome does should be borne in mind in considering its profile.

UNIT-DRIVE AIR COMPRESSOR

SPECIALISTS in the field of aircraft pneumatics, the Hymatic Engineering Co., Ltd., Redditch, have recently co-operated with the English Electric Co., Ltd., in the development of an electrically driven compressor unit for use on jet aircraft where no direct mechanical drive from the gas-turbine installation is available.

A considerable saving in weight has been effected by dispensing with the usual engine-driven gear box and by providing instead a drive to a large electric generator capable of powering the aircraft auxiliary services. It is claimed that, despite the additional electric motors required, the weight reduction effected is appreciable. Actuated by this generator, the new unit, known as the Hymatic Type EMC1, consists of an English Electric 0.9 h.p., 9,500 r.p.m., 24-volt motor, which drives a standard Hymatic compressor (450 lb/sq in, or, alternatively, 600 lb/sq in) through a reduction gear box with a ratio of 7.25 to 1. A cooling fan is fitted at the other end of the motor armature shaft. The 600 lb/sq in compressor delivers 1.25 cu ft of free air a minute.



The new Hymatic air compressor, type EMC-1.

Lubrication for the compressor is of the dry sump type and is provided by a forced oil supply from pumps and tank housed in the reduction gear box. Current drawn by the unit ranges from 30 amp at zero pressure to 44 amp at 600 lb/sq in.

A further series of electrically driven units providing pressures of 1,000 lb/sq in is now being developed and these will be available with an alternative A.C. motor operating on a 200 v 400 cyc three-phase supply.

A TRUE PERSPECTIVE

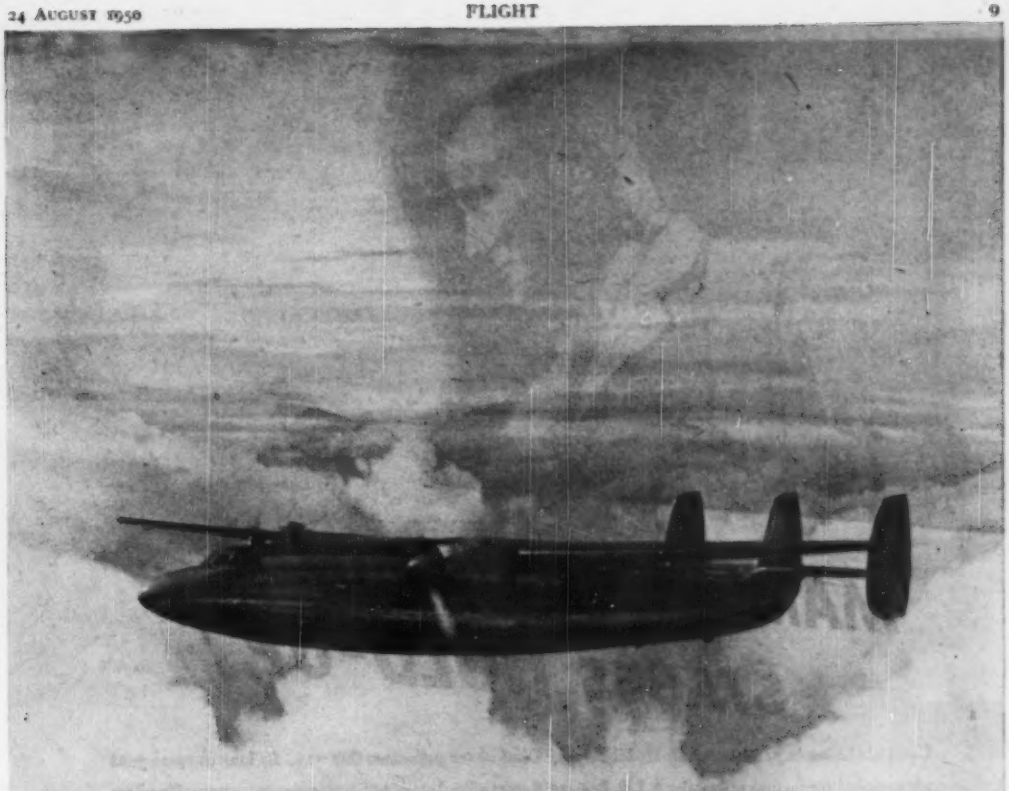
"Keep the Memory Green—The Story of Dunkirk," by Lt-Col. Ewan Butler and Major Selby Bradford, M.B.E., M.C. Hutchinson and Co., Ltd., London. Illustrated. Price 12s 6d.

THIS is a story of the events leading up to Dunkirk, and of the withdrawal itself, by two soldiers of the B.E.F. But it is like none of its predecessors, for, although the authors leave little doubt of the average soldier's picturesque views on the R.A.F. in those tragic days, they point out that, in fact, the crews of the all-too-few Hurricanes, Battles, Blenheims and Lysanders were "perhaps the bravest of all the men of the British Expeditionary Force."

There are scores of tales of courage and devotion to duty by all three Services and by the civilian sailors who manned the fleet of little ships which contributed so much to the success of Operation *Dynamo*. They are written with a well-justified sense of pride, but without any illusions, for the authors quote Winston Churchill's words that, "We must be careful not to assign to this deliverence the attributes of a victory. Wars are not won by evacuations." Nevertheless, they add, "There was a victory inside this deliverance which should be noted; it was won by the Royal Air Force," which, with the French air arm, shot down more than 2,000 German aircraft in the Battle of France—more than were destroyed in the Battle of Britain that followed!

FORTHCOMING EVENTS

Aug.	26.	Wiltshire Flying Club : Thruxton Races.
Aug.	26.	R.N. Air Stations H.M.S. *Daedalus* and H.M.S. *Siskin* : "At Home" and Flying Display, Lee-on-Solent.
Sept.	2.	International Contest for Free Balloons, Holland.
Sept.	2.	Coventry Aero Club : Siddeley Challenge Trophy Race Baginton, Coventry.
Sept.	5-10.	S.B.A.C. Flying Display and Exhibition.
Sept.	8-11.	Biarritz International Rally.
Sept.	15.	Battle of Britain Day.
Sept.	16.	R.A.F. : "At Home" Day.
Sept.	16.	*Daily Express* International Air Race, Hurn Airport, Bournemouth.
Sept.	17.	Air League (Portsmouth Branch) : Air Display.
Sept.	19.	Aero Golfing Society : Autumn Meeting (Callon Cup) Sudbrook Park.
Sept.	23.	Unveiling of Air Transport Auxiliary Plaque in St. Paul's Cathedral.
Sept.	24.	Association of British Aero Clubs and Centres : Summer Convention, White Waltham.



The cruising measurements obtained with the first production Ambassador suggest that the day-to-day speeds, in service, may well show an improvement on those so far published.

At 15,000 ft., for instance, and cruising in maximum weak mixture, the measured true air speed was 290 m.p.h. at a weight of 45,000 lb. This figure compares favourably with the prototype-developed estimates for the same height, power and weight.

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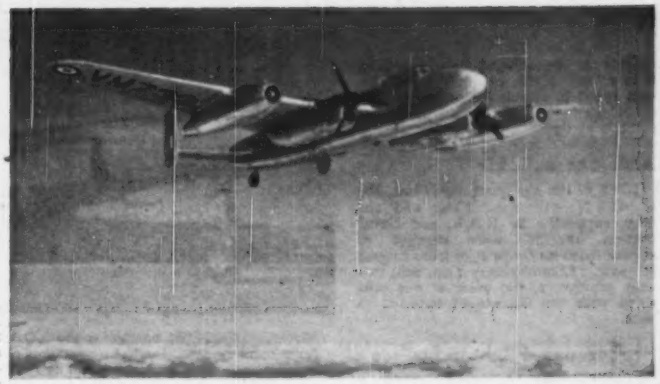
Scientific

HERE and THERE



NEW JEWEL, OLD SETTING : Two of Armstrong Siddeley's powerful new Sapphire axial-flow turbojets are mounted in this Lancastrian test-bed. The installation was undertaken by Air Service Training, another member of the Hawker Siddeley Group of companies. The airscrews of the inboard Merlins are feathered in this view.

Naval Display

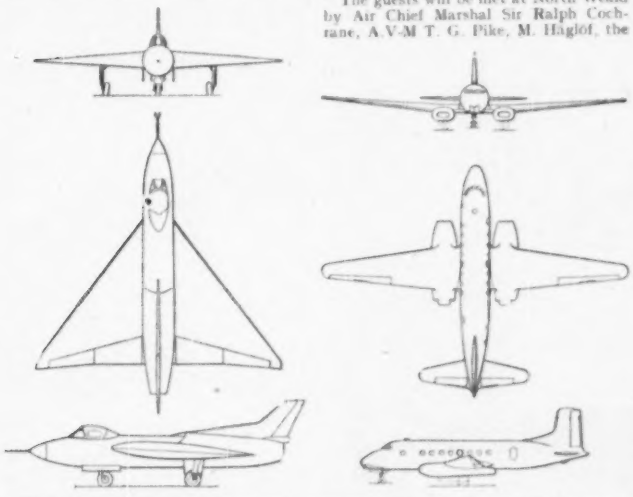
ON Saturday next (August 26th), H.M.S. *Daedalus* and H.M.S. *Sisbis* will be at home to the public at Lee-on-Solent, and a full flying display is being staged to mark the occasion. During the morning a formation of some 70 Naval aircraft will fly over several south coast towns as an overture to the main programme, which begins at 2.30 p.m.

The display will include R/T request aerobatics by a Sea Fury and Harvard, and precision aerobatics by Sea Hornets and Sea Vampires. Firebrands and Sea Hornets of No. 1 Carrier Air Group, with Seafires of No. 1832 R.N.V.R. Squadron, will demonstrate dummy deck-landings. A comprehensive static display has also been "laid on." The display opens to the public at 1 p.m.; admission prices are 1s (adults) and 6d (children).

Selling Well

WITH a new order for four Model 1049 "Super" Constellations, Eastern Airlines has now contracted for a total of 14 of these 92-seat versions since April. Trans-World Airlines, also, has ordered six new Constellations. To be delivered next year, they will bring the T.W.A. "Connie" fleet to a total of 67.

The new type of Constellation has an 18-ft longer fuselage than present versions. It is reported to have been redesigned with an eye to conversion to Allison T-38 turboprops, each delivering in the region of 3,000 equivalent s.h.p. Construction of a turboprop-powered prototype is, in fact, said to be well under way. In the main, the world's Constellation operators do not utilize fully the aircraft's range capabilities; a reduction in range would not therefore be serious, particularly if it were offset by an increase in power and payload.



TWO FOR RESEARCH : Although neither has yet flown, it is hoped that these contrasting Avro prototypes will perform at the forthcoming S.B.A.C. Display. The delta-winged Avro 707B (left) differs mainly from the original model in having a longer nose; and the Ashton is a Nene-powered jet airliner, primarily for high-altitude research.

Swedish Vampires' Visit

VAMPIRES of No. 72 Squadron will meet Vampires of a Swedish fighter squadron over the English coast on August 30th and the visitors will be escorted to the R.A.F. fighters' base at North Weald. Three Ju.86 transports will arrive at about the same time, carrying ground crew and two reserve Vampire pilots.

The guests will be met at North Weald by Air Chief Marshal Sir Ralph Cochrane, A.V-M T. G. Pike, M. Haglöf, the Swedish Ambassador, and Lt. Col. Von Arbin, the Swedish air attaché. During their stay the Swedish airmen will visit R.A.F. Stations Waterbeach and Linton-on-Ouse. They will also call at Hatfield to see Vampires in production and, on September 7th, watch the S.B.A.C. Display at Farnborough. No. 72 Squadron will again provide an escort when the Swedish guests leave on September 8th.

Fairey's Australian Manager

AIR COMMODORE C. B. WINCOTT, C.B.E., has been appointed general manager of the Fairey Clyde Aviation Company Pty., Ltd., of Bankstown, Sydney, Australia, in succession to A.Cdre. F. Kirk, O.B.E. Fairey Clyde Aviation is an associated company of the British Fairey concern.

A.Cdre. Wincott's last Service appointment—from January, 1946, to September, 1948, when he retired—was as air attaché in Moscow. He has since been associated with the operations division of Flight Refuelling, Ltd. His career in aviation began in 1912, when he joined the Sopwith Company as an apprentice. During the 1914-18 war he served in the R.N.A.S., was released in 1919 and joined the R.A.F. as a flying officer in 1922. His appointments during the ensuing years included six years in H.M.S. *Eagle*, test-flying at Martlesham Heath and a series of senior aircraft-production posts during the late war.

A slight reduction in the number of pages in "Flight," and some delay in reporting events, continue to be unavoidable as a result of the withdrawal of overtime working by a section of the printing industry.

Mercators Delivered

MARTIN P4M-1 Mercator patrol bombers have been delivered to VP-21 Squadron of the U.S. Navy, based at Patuxent, Maryland. As yet, the U.S.N.'s order is for only 19 Mercators.

The Mercator is the second aircraft to go into squadron service with both turbojet and piston engines (the Ryan Fireball fighter was first). Two Allison J-33 turbojets are housed in the nacelles of the two Pratt and Whitney R-4360 radials.

HERE AND THERE . . .

The jets are not intended for use on take-off or normal flight, but only for giving extra speed in attack (or defence). For anti-submarine warfare, the "newest detection devices" are installed.

Land, Sea and Air

UNITS of the Mediterranean Fleet, the U.S.N. 6th Task Fleet and the Army, supported by R.A.F. and Naval Aviation aircraft, were engaged in *Defence Exercise Malta 1950* from August 17th-20th. Like *Highway Two*, held two weeks previously, the exercise was concerned with the defence of convoys to Malta.

Farnborough Flight-Refuelling

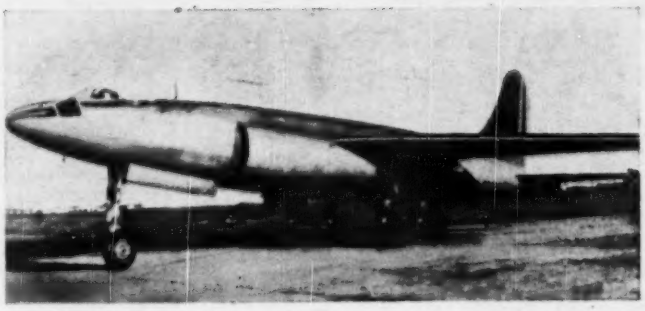
FLIGHT-REFUELLING of a Meteor promises to be one of the outstanding items on the programme for the forthcoming S.B.A.C. Display at Farnborough. The tanker aircraft will be a Lincoln and the method employed will be the "probe-and-drogue" system developed by Flight Refuelling, Ltd. The operation has only once before been performed in public—at Beaulieu last September.

With present equipment, Flight Refuelling can achieve an aerial pumping-rate of 250-300 gal/min, and an increased rate of 500 gal/min is envisaged. Since the Meteor has only to connect the Lincoln's cone-ended refuelling hose with its own nose-mounted probe (which, incidentally, weighs but 28lb) before the flow begins, replenishment of the fighter's internal tanks is achieved in little over a minute.

America's Auxiliaries

FOLLOWING the withdrawal—for use in Korea—of a number of Mustangs from squadrons of the American Air National Guard (a force equivalent to, though larger than, Britain's R.Aux.A.F.), the delivery of jet fighters has been stepped up. Aircraft destined for the 24 A.N.G. fighter groups include, it is reported, F-86 Sabres, F-84E Thunderjets and F-94 Shooting Star night fighters. Twelve of the squadrons already have jets—six fly Shooting Stars and six have earlier-mark Thunderjets.

According to the latest American statistics, the first-line aircraft strength of the A.N.G. consists of 223 Douglas B-26 Invader light bombers, 122 Shooting Stars, 111 Thunderjets, 926 Mustangs and 543 Thunderbolts. There are, in addition, large numbers of transports and trainers.



FRANCE'S FIRST jet bomber is the S.O.4000, powered by two Hispano-Suiza-built Rolls-Royce Nenes. The M.1 air-launched glider and M.2 (R.-R. Derwent) were produced as scale models to investigate design problems with the 4000. The S.O.M.2 has achieved over 600 m.p.h. and tests with this useful research aircraft are continuing.

Canadian Sabres

AS mentioned last week, the first North American F-86 Sabre to be built under licence by Canadair, Ltd., made an initial flight at Dorval, Montreal, on August 9th. Captain "Al" Lilly, chief test pilot to Canadair, flew the aircraft.

The flight was witnessed by several senior Government, R.C.A.F. and Canadair officials, including Mr. Brooke Claxton, Defence Minister; Air Marshal W. A. Curtis, Chief of the Air Staff; and Mr. J. G. Norman, executive vice-president of Canadair. The Canadian contract, signed over a year ago, is for 100 Sabres. The first Canadair-built Sabre is powered by a 5,000-lb thrust General Electric J-47 turbojet, but the possibility of employing the Avro Canada Orenda has been considered.

NEWS IN BRIEF

THE F.A.I. has officially confirmed Mr. L. R. Colquhoun's 100-km closed-circuit flight at 241.88 m.p.h. in a Supermarine Seagull as a world record. It was set up during the Air League Challenge Cup Race at Sherburn-in-Elmet on July 22nd.

* * *

In the list of award-winners for 1949-50 issued by the Institute of Transport appears the name of Capt. H. K. Gordon-Burge of Aer Lingus. He receives the Bristol and White-Smith Air Transport Student Prize for his *Critical Analysis of Post-war Airline Accidents*.

* * *

Mr. G. R. Jones, who completed a five-year apprenticeship with the Gloster Aircraft Company in September, 1949, has been awarded an S.B.A.C. scholarship to the College of Aeronautical Engineering, Cranfield. The scholarship is for a two-year course, and is valued at £275 per year.

* * *

The trustees of the Busk Aeronautical Studentship (awarded annually in memory of Edward Teshmalker Busk, who was killed flying an experimental aircraft in 1914) announce that the studentship for 1950-51 has been won by Mr. Robert Westley of the College of Aeronautics, Cranfield.

* * *

At the recent annual general meeting of Oldham and Son, Ltd., the battery manufacturers, it was announced that negotiations had been completed with the Indian Government for the establishment of a company in Madras under the title of Oldham and Son, India, Ltd. This will be the firm's third overseas enterprise, the others having been established in France and South Africa.

* * *

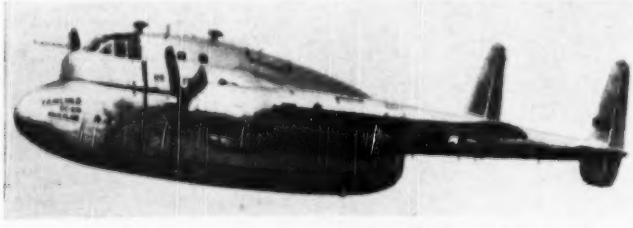
Employees at the Barkingside factory of Kelvin and Hughes, Ltd., engaged on the production of aircraft instruments, have shown such interest in the forthcoming S.B.A.C. Show that the management has arranged coach transport to Farnborough for 100 employees on Saturday, September 9th—the first "public" day.

* * *

Mr. F. J. Dellar, sales director of Cossor Radar, Ltd., left England by B.O.A.C. on August 15th for an extensive tour of the Middle and Far East. He will visit Japan, Australia, New Zealand, the Malay Peninsula, Siam, Burma, India, Kuwait, Persia, Bahrein, Syria, Egypt, Turkey and Italy.

* * *

Albright and Wilson, Ltd., 49, Park Lane, London, W.1, who for the past four years have distributed silicones for the Dow Corning Corporation of America, announce that they are to begin their manufacture in this country. Silicone products have applications in a great many fields, including the manufacture of insulating materials, hydraulic fluids, resins and varnishes and silicone rubber.



PACKET PLUS: Developed from the C-119 Packet, the Fairchild C-120 Pack Plane has a completely detachable lower fuselage, capable of carrying 20,000 lb of equipment or 66 troops, to permit quicker turn-round. It is seen on its recent first flight.

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Gunnery

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Fighter Armament

What is Wanted To-day—and What is Still Missing : A Critical Examination of Progress.

Part I : Important Lessons from the Past

By . . . . . A. R. Weyl, A.F.R.Ae.S.

"It is futile to derive comfort from the American worship of the 0.5 in calibre . . ." Armourers at work on a Republic Thunderjet, mounting six Colt (Browning) -type guns of half-inch calibre

In this outspoken article an aircraft designer who has closely studied military requirements over a long period contends that British fighters are still under-gunned, and alleges that even from the time of World War I our armament experts have been dangerously conservative and reluctant to profit by the experience of successful experimenters abroad. While not necessarily endorsing all Mr. Weyl's views, *Flight* considers them worthy of most serious study. It must, of course, be realized that new and efficient weapons may well be under development or even in production.

"JUST before the close of hostilities, six experimental Me 262, each equipped with forty-eight R.4/M missiles attached beneath their wings, attacked a raiding party of B-17E Flying Fortresses, destroying fourteen and returning to base without loss. After this success, a priority order was placed for 25,000 R.4/M, just two-and-a-half weeks before the fighting ended. The results that might have been achieved with this weapon in a few more months are frightful to contemplate."

The foregoing passage is from *German Research in World War II*, by Col. L. E. Simon, U.S.A.F. To-day, a seeker after knowledge from official sources might, perhaps, be told (a) that no such weapon existed; (b) that it is known but absolutely uninteresting; (c) that enquirers belonging to air forces outside the Atlantic Pact will have a specimen handed over for study.

In the meantime, all this country's fighter aircraft possess armament which would have been adequate in 1938, and which might have rendered excellent service during the Battle of Britain. In A.D. 1950, however, such armament is antique and as effective as peashooters to fight riflemen. To-day, the weapons of intercepters are no longer the exclusive concern of those who have to fight with them: *the nation's existence depends on the effectiveness of air defence*. The threat of airborne atomic weapons, of nerve gases and other horrors have put a very definite stop to shilly-shallying in matters of air defence.

Four or five years ago, ex-Luftwaffe air-combat experts were amazed to find new British jet fighters still armed with 20 mm shell guns of a (modified) 1916 type; in vain they pointed out that already, in 1944, the installation of four 30 mm very modern shell-guns in the Me 262 had proved inadequate.

Modern vehicles are designed around the load or equipment they have to carry; so are modern aircraft. In military aeronautics, however, where armament always lagged centuries behind, it is too often the other way round, because armament technicians persistently produce weapons for the aircraft of yesterday. This leads to initially good aircraft being afflicted with the nightmares of official sleepers who exist in august but secretive isolation, away from the brutal exigencies of reality. It produced the cherished "flying christmas tree."

Aircraft for the interception and destruction of aerial intruders are simply weapon carriers, to place a weapon and its operator into position for attack at minimum risk. Intercepter development is, hence, a straightforward problem.

A ruthless enemy bent on offensive action with modern means of total destruction and general paralysis—instead of pottering about with a few tons of H.E. bombs or incendiaries—compels the country attacked to insist on a *total* air defence. Gone are the times in which soothing apologies like "the bomber will always come through," or, "a few intruders will occasionally manage to slip through the best air defence" could be tolerated. If any intruder can still come through, the defence is bad, and this is an admission of defeat before a war has even started. It also means the encouragement of potential enemies. Moreover, there will be no future sitting war, with dirty linen hanging from the Siegfried Line—and sufficient time for Beaverbrooks to instil some animation into departments responsible for the provision of air defence.

Within Britain's air defence, the manned intercepter aircraft claims priority. It may, at some future date, be superseded by other, perhaps fantastic, weapons. Against certain forms of attack, even now, other defence devices may provide the answer. But there is no replacement yet for the manned intercepter as main support of air defence.

Hence there is every need to insist that our armament technique provides the means to destroy any sort of aerial intruder. This science has to keep pace with aeronautical, tactical and strategical progress. Up to now, this has not been so. In the past, either the aircraft designer or the aircraft operator has had to take armament development in hand when there was immediate operational need. This is, unfortunately, no longer possible. There will be no Roumanian drill designer to solve an armament problem which the official gun experts had failed to recognize!

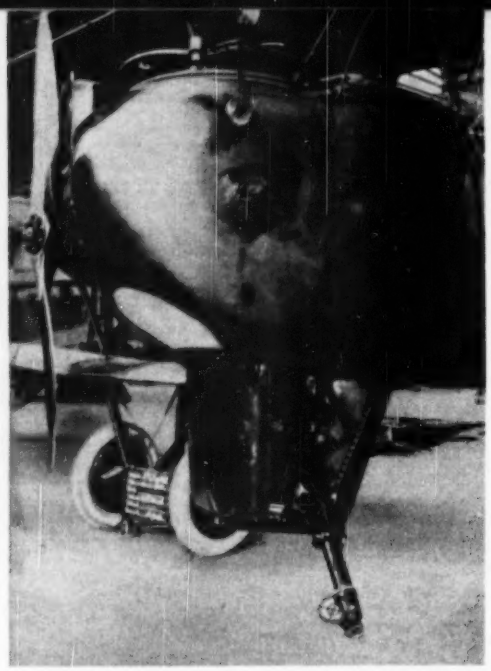
However justified the official regret may be that the crossbow was given up in favour of gunpowder, the dire fact must be faced that all British fighter aircraft are underarmed; and Ministerial promises will not alter it.

It is futile to derive comfort from the American worship of the 0.5in calibre (hence the widely advertised fighter performances). In each of two world wars, American fighter equipment failed to impress the combatants when displayed on the scene of action. Moreover, the United States, had never to worry about home defence, whilst Britain was always in the front, taking the first blows besides. Recent news, in addition, indicates that U.S. intercepters will fight with small supersonic rocket missiles (probably developments of the German R.4/M).

The German Becker gun of 1916 (of which the British Hispano gun is but an adaptation of a modification) was designed for use against armoured ground targets such as tanks and submarines. Intercepters demand special weapons for aerial target. In the Luftwaffe, the corresponding shell-gun, the Oerlikon (different in ballistics) was discarded in 1941. Even disregarding the opinion—expressed by U.S. ordnance engineers—that the development of an automatic gun takes five to ten years, a modern air-combat weapon cannot be created by sleight-of-hand when the operational need reveals itself to those concerned.

The weapon specialist no longer has the excuse that his first duty is to provide for ground warfare; and that air-combat weapons should be adaptations only. The R.A.F. is now the *first line of defence*; thus special air-combat weapons for intercepters have a claim to development in their own right.

A disconcerting aspect in development is the experts'



"The German Becker gun of 1916 (of which the British Hispano gun is but an adaptation of a modification) was designed for use against armoured ground targets . . ." Illustrated is a 20 mm Becker mounted defensively on an A.E.G. long-range night-bomber.

Fighter Armament . . .

inability to appreciate experience gained elsewhere. However well mentally equipped they may be—some are indeed so—most appear to be blissfully unaware on what ground they are building, and to care little about experience other than their own. These hamadryads are offended when reminded of such experience and withdraw with hurt feelings into the trees of top secrecy, like snails into their shells. Too many, moreover, seem to recoil automatically from new ideas. Finally, the inclination of arms experts to maintain a dogma of infallibility is paramount.

It is, consequently, not surprising that fighters are undergunned, that mistakes are repeated, that postulates are held up with arguments long known to be fallacious, and that hopeful developments are arrogantly cast aside—to the delight, no doubt, of potential enemies.

Before discussing some weapon developments, a brief historical examination of air-combat methods may be made for the benefit of those who believe that experience gained in the past may yet be helpful to an appreciation of our present problems.

A few examples taken at random will show that there was and is sufficient inspiration for armament planners to draw from.

In 1914, Lt. R. Clark-Hall, R.N. (later Air Marshal), then in charge of the aircraft armament of the R.N.A.S., predicted air combat as the main purpose in the use of guns. For this reason he demanded specialized armament, and that the aircraft carrying it should have superior speed, good climb and pusher airscrews. We got all this—except the specialised armament. In France, at the same time, aircraft were being developed with guns exclusively for air combat.

F. M. Green, a noted aircraft designer, stated, in 1921, his belief that the rate of fire ought to be stepped up, and that special guns were required, for air combat. The multi-gun fighter arrived *13 years later*, under pressure by far-sighted R.A.F. officers, and against the advice of some armament technicians.

That fighter pilots had clear ideas about the requirements of air combat is evident from what Major Oliver Stewart, M.C., A.F.C., wrote in about 1923 (in his book on air fighting):—

"The fighting aeroplane of the future will be a very small all-steel monoplane mounting a 1,000 h.p. gas-turbine engine and possibly incorporating some form of jet propulsion. It will be capable of 400 m.p.h. on the level and will have a terminal velocity in the dive of nearly 800 m.p.h. In other words, it will be able to travel faster than sound. It will climb to 20,000ft in 4 min, and its service ceiling will be 60,000ft. . . . The pilot will be enclosed in a pressure suit. Looking further ahead, I feel that the totally enclosed pressure cockpit, with some form of transparent, streamline conning-tower, must eventually be incorporated.

"The fewest possible accessories will be carried. They will have none of the bomb racks, flare tubes, signal pistols, landing and navigation lights, fire extinguishers, and other odds and ends.

"The gun will be of smaller bore than the modern m.g. It will be a composite weapon consisting of several barrels, and will have a terrific rate of fire.

"There will also be long-range fighters which will escort the ground-attack formations. They will be two-seaters, and will be far less swift and less vicious than the specialized fighters."

When, 27 years ago, Stewart believed in the engine-operated sub-calibre gun, he was in perfect agreement with the views which progressive armament experts abroad held at the time. The "odds and ends," incidentally, are still with us.

Basic Principles of Interception.—Air combat obeys the principle of every combat: to destroy an enemy in the shortest time and at minimum risk. The effort required matters but little: war is not a profitable business anyhow, and in the age of atomic warfare means to frustrate such weapons are invaluable.

Four basic categories of interception present themselves: (1) High-altitude; (2) Low and medium altitude; (3) Blind interception by "all-weather" fighters; and (4) Escort-duty protection.

Escort fighters will not be required to seek the enemy, but to defend their formations; such fighters and those used for "all-weather" operation may possibly be identical in type. All-weather interception would make good use of refuelling and rearming in flight, permitting long patrol missions and avoiding losses other than by mechanical deficiencies or enemy action.

For high-altitude interception, two distinct aircraft classes will possibly be needed: subsonic and supersonic intercepters. Operation within the transonic domain of speed will probably not be practical. Both intercepter classes will differ in power-plants, but might have basically similar armament. The single-seater will score.

Whatever the boldness of aircraft conception, the primary problem to be settled is that of the offensive weapon.

Tactically, much arguing is going on about the ability of intercepters to engage the enemy at all. The U.S. Navy, for instance, states that its jet fighters can intercept any modern bombers such as the B-36. The U.S. Air Force claims that ceiling and speed of this bomber (which carries an atom bomb) might be increased so that no subsonic fighter could approach close enough for effective attack.

The specific argument is, of course, of little importance because American fighters with their 0.5in guns are distinctly undergunned (Russian intercepters carry 30 mm shell-guns and even bigger weapons), and because such statements may have been made for reasons of propaganda. But the core of the argument is that the modern bomber has become so fast and powerful in climb and ceiling that there is but a small margin left in favour of the intercepter, and that the time available for effectual interception ("effectual" because destruction *after* the bomber has reached the target area is no longer of the slightest value) has become desperately short.

"The famous Fokker monoplane was actually a very mediocre aircraft . . . and Fokker was not a weapon specialist, but a hobbyist with a gift for improvization . . ." Anthony Fokker is seen with his famous synchronized-Spandau-armed monoplane fighter.

Bombers formerly had 50 per cent lower ceiling and 25 per cent lower speeds than had intercepters. To-day a level-speed difference of only 2 per cent, and ceiling differences of 11 per cent, are already considered "desirable" in order to provide any chance for stalking and attack. As the sonic régime operates against the intercepter in more than one sense (rendering it unsteady, too, as a gun platform), the obvious solution would seem to be the supersonic intercepter. This, however, suffers from lack of manœuvrability in positioning for attack, a fact which explains the emphasis that is to-day laid upon air-to-air missiles provided with homing devices. These would, so it is reasoned, allow attack from distances of miles away and from any position. The fallacy is that guided homing missiles are really practical in exceptional cases only; they can never replace a multitude of aimed projectiles fired by the intercepter. Hence the close-range attack with effective salvos and bursts would still seem absolutely necessary for success in destruction. But the intercepter carrying the weapon must have superior speed and climb, and this is not beyond the bounds of possibility.

Air-Combat Technique During World War I.—As soon as the first flying machines skimmed the grass it was visualized that armed aeroplanes could be used against airships (then already able to carry bombs). The official views on air combat were conflicting: the U.S. Army contemplated the installation of a machine gun on their one and only Wright biplane (1910) but, wisely, abstained; the British General Staff decided (1911) that there were no prospects of aerial reconnaissance pilots coming into armed disagreement; gentlemen would respect one another's duties, on both sides. Latham, an enthusiastic hunter as well as an eminent pilot, publicly assured that, so far as he was concerned, he would rather prefer to sit in the aircraft to be shot at, rather than in that in which the gun was installed; and, considering the structural qualifications of his Antoinette monoplane, he was perfectly right. In 1912 R.F.C. pilots expressed similarly understandable dislike of the proposal to fire through the airscrew disc.

The conception of fighters for air combat was actually created in this country, though in combination with the idea of ground attack. The existence of Zeppelins was responsible. Also, the "scout" single-seaters developed before August 1914 formed indeed an ideal basis for superior intercepters—if the weapon experts could have produced any arm worth installation. As it was, the Zeppelins and the slow, twin- and multi-engined German bombers had little to complain about on the score of air interception. Overseas, the R.F.C. and the R.N.A.S. suffered most serious losses during 1915 and 1916 through lack of suitable weapons.

It is of no use to pretend apologetically that the "Fokker plague" of 1915-16 was the outcome of a superior invention handled by superior people with superior aircraft. The brutal truth is that (a) a fixed installation of machine guns to fire in the direction of flight—essential for single-seater air combat—had been publicly exhibited in 1912 and described in patents which even gave the sighting devices; (b) that the synchronization of guns to fire through airscrew discs had not only been explained in Franz Schneider's patents, but also been experimented with by Léon Morane, in 1914, besides being the subject of investigations at Farnborough; (c) that the famous Fokker monoplane was actually a very mediocre aircraft, scarcely faster than any two-seater of the period, and very much inferior to British scouts of 1914 vintage; and (d) that the armament of this famous aircraft was neither particularly efficient nor reliable; after all, the German gun experts needed two years to redesign a Maxim gun for air-cooling; and Fokker was not a weapon specialist either, but a hobbyist with a gift for improvization, besides being a first-class business-man.

Because weapon experts failed to provide for aircraft, whilst carefully guarding secrets of their trade, all guns operationally used were mere adaptations of army machine guns. Although, thanks to Sir Hiram Maxim, this country had a key position in this field, "no Britisher has yet designed a machine gun which was adopted into any one of our own Services," according to a public statement by an R.A.F. officer in charge of airborne arms (1947). The Lewis gun was American, and only the modified Vickers-Maxim gun could be considered an indigenous design.

In 1914-15, some daring French pilots attained air victories with a crude device to put a few bullets through the airscrew disc. In April, 1915, Fokker, then a young aircraft designer of appreciated versatility, was asked to copy this idea without delay. He contrived to wheedle a machine gun out of the Spandau stores, and produced, within a few days, a primitive cam-and-push-rod device actuating the trigger from the engine. Fokker had never seen a machine gun before. The device was immediately successful, and the sorry consequences produced an outcry for counter-action in this country.

"The Sopwith Dolphin had four guns . . ." Depicted is one of these biplanes, armed with two Vickers and two Lewis guns.

In November, 1915, Col. Brooke-Popham urgently demanded a similar device. Even the Russians had constructed, in that year, a single-seater with a synchronized Maxim gun, operated by a plain cam control. It would have been equally simple to do so here, or to copy the perfected Fokker flexible-shaft control gear (of which the French had collected a specimen). Instead, the matter was grossly delayed. Outsiders took the problem up, and provided improvised solutions. Finally, upon pressure by an officer who transgressed his authority, a hydraulic rock-drill was modified to actuate a gun trigger, and the Constantinesco gear was produced.

But not until May, 1916, did the first British aircraft with a synchronized gun (Sopwith-Kauper gear) appear in France. The armament experts might, in the end, have accomplished a synchronizer gear, but with a few years' more delay—just the difference between winning and losing a war.

During 1914-18, over 90 per cent of all aircraft shot down fell victim to surprise attacks from ranges of no more than 100 yards, and sometimes as close as 20 yards. The official German air-combat instruction prescribed approach to less than 100 metres before opening fire; firing over wider ranges ought to be used only with telescopic sights to compel the enemy to turn, or to help a fighter in distress. G.H.Q. *Notes on Fighting in Single-Seater Scouts* (November, 1916), too, recommended approach to about 100 yards, to hold fire until 50 yards of range, and to employ bursts of 15 to 50 rounds. During 1916-18, fire sequences of 100 rounds were exceptional. Bursts averaged 20 to 30 rounds, thus the maximum firing time (during which aim had to be held) was generally less than 4 sec. An average expenditure of ammunition per engagement was 100 rounds, i.e., three to five bursts.

Aircraft had little or no armour that could give protection against armour-piercing rifle-calibre balls fired from 100 yards range. Hence, rifle-calibre ammunition was adequate. Toward 1917, a higher density of fire was felt desirable, in order to produce results at the first attempt (repeated attacks on armed two-seaters were proving increasingly difficult). This led to a multiplication of intercepter guns. By 1916, Immelmann had already employed a battery of three guns. Two-gun installation soon became general. The Sopwith Dolphin had four guns, and a six-gun fighter was designed in 1918, but soon forgotten. Nevertheless, for various reasons, the twin-gun installation remained, for many years, the standard armament of the single-seater.

"A Voisin squadron with 37 mm Puteaux single-shot shell-guns was operationally employed for ground attack and, occasionally, also for air combat." Illustrated is this early installation.

"The 1930 Westland single-seater had the gun arranged to fire obliquely upwards . . ." (This type met a 1927 specification).

Fighter Armament . . .

During 1917-19 (and again later) the Germans pursued another solution to increase fire-density. Since gun synchronization greatly reduced rate of fire, engine-operated guns were developed. In such guns, the loading and firing is performed by engine power, i.e., independently of the energy of the propellant in the cartridge.

At least three types were under active development in Germany. The main principle was that of a crank with the breech-block forming a reciprocating piston. As the gun worked in synchronization with the engine, no special gear to actuate the trigger was required. It was found that such "motor-guns" were lighter, and fired at a much greater rate, than any ordinary machine gun.

The Siemens motor-gun, able to fire 2,400 rounds per minute from two barrels, was the only one to progress to operational trials: it produced an air victory at the first attempt; but during a subsequent attack the gun began to swell alarmingly, on account of a rapid accumulation of unfired cartridges in the case of the mechanism, and the pilot did his best to reach earth again in a hurry. Such guns, of course, needed perfect ammunition, and would not tolerate "hang-fire" cartridges. With electrically ignited ammunition, the motor-gun would have been more practical. Of the Fokker-Luebbe motor-gun and its derivatives, an improved version was placed at the Air Ministry's disposal during 1938, but failed to raise interest; perhaps it was not even tested. Fokker himself held that his own gun design, with a terrific rate of fire, was the only intercepter weapon worth while installing. During 1918, incidentally, the Austrian authorities decided to adopt the Gebauer motor-gun as their principal fighter weapon; in later comparative tests, however, it was found less efficient than those of Siemens and Luebbe.

As regards ammunition, international conventions, concluded before 1914, prohibited the use of explosive ammunition and "spreading" bullets in rifles and machine guns of up to 19 mm calibre; this agreement was generally adhered to up to about 1916. In other directions, three important developments became general: the incendiary bullet, the tracer bullet, and the armour-piercing bullet.

The first arose from the necessity to ignite the combustible gas-filling of airships, and originated in this country. Later it was found that incendiary bullets could ignite fuel tanks, and thus white-phosphorus-filled bullets were generally adopted. They were prone to self-ignition when stored close to the engine, however, and their ballistic properties differed from those of ordinary ball ammunition.

The tracer bullet conveyed an immediate advantage in air combat. In spite of some ballistic difference, tracers were soon found indispensable, and they were retained until automatically computing sights rendered them superfluous. The armour-piercing (steel-core) bullet was originally intended for ground attack. In air combat it was employed to cause engine damage, and for use against the metal or armoured aircraft which came into use during 1918.

In the first place, the introduction of shell-guns as fighter armament was due to the desire to attack objectives on both land and sea. In air combat, the use of flatter trajectories and with explosive shells allowed attack over ranges which the target aircraft could not cover with defensive fire.

Britain, France and Germany share equally in the early history of airborne shell-guns. British interest, however, soon petered out. There was an American aircraft gun, too, the recoilless Davis; it fired at both ends, to the discomfiture of designers and gunners.

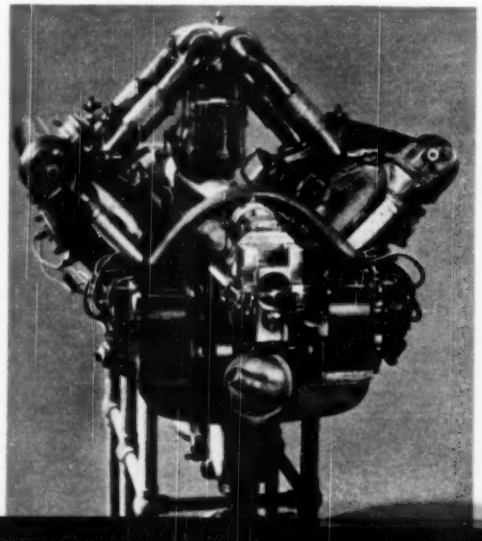
The 20 mm single-shot C.O.W. shell-gun, tested at Farnborough in 1913 in a F.E.3, showed that firing of such a weapon would not impair aircraft stability, but that an automatic gun was required. A 2-pdr Vickers, too, was tested, but the airframe of the Farman used for the experiment threatened to disintegrate. In January, 1914, a 37 mm semi-automatic Vickers was installed in a special Short "Gun-Carrier" seaplane and fired in flight. During the 1914-18 war, 1- and 1½-pdr automatic C.O.W. shell-guns were tried in Voisin pushers and found practical. A few of the 20 mm guns were even operationally employed in France, installed in F.E 2bs, for nightly ground attacks.

Till 1930, further experiments were made with 37 mm automatic C.O.W. and Vickers guns. The interest then evaporated, and the shell-gun experts turned for some nine years into sleeping beauties. Even for air combat, a serious attempt had been made to provide an intercepter with a 37 mm shell-gun. This 1930 Westland single-seater had the gun arranged to fire obliquely upwards to clear the airscrew. When the gunnery experts were aroused to appreciate the fact that a war was impending, all they could discover was the Hispano gun.

In France, secret firing trials with a 37 mm Hotchkiss single-shot gun had been made from a Voisin biplane as early as the autumn of 1913; but when a shell was accidentally put into a very civilian hostel, the secrecy, too, was exploded. The experience gained was exploited during 1915, and a Voisin squadron with 37 mm Puteaux single-shot shell-guns was operationally employed for ground attack and, occasionally, also for air combat. The mounting was semi-flexible, permitting adjustment in elevation by 30 deg either way. Against German fighters, however, these two-seaters proved helpless; several were brought down, proving that ability to fire over long ranges is useless if it is not matched by adequate fire density and aircraft performance. One of these Voisins carried a naval gun of 47 mm calibre, also of Puteaux design. On the whole, the Voisin-Puteaux combination, with a rate of fire of about one shot per minute, did not prove a success.

Guynemer suggested, in 1916, the installation of a shell-gun in single-seaters, for air combat over long range as well as for attacks on the German submarines then based at the Flanders coast. The suggestion was taken up by Marc Birkigt of Hispano-Suiza. He modified the 37 mm Puteaux gun for single-hand loading by the pilot in flight, shortened the barrel (at the expense of muzzle velocity), and placed it between the cylinder blocks of a geared Hispano-Suiza eight-cylinder engine so that the gun could fire through the hollow airscrew shaft and hub (incidentally, a 1912-13 idea of F. Schneider and Daimler). The gun was elastically attached to the crankcase by way of a recoil spring and a hydraulic recoil brake. The 220 h.p. Hispano *moteur canon* thus created was installed in several single-seater types (British and French), notably Spad biplanes. In July, 1917, Guynemer succeeded in shooting down a German aircraft at 200 yards

"Marc Birkigt of Hispano-Suiza . . . modified the 37 mm Puteaux gun for single-hand loading by the pilot in flight . . . and placed it between the cylinder blocks of a geared eight-cylinder engine . . ." An early Hispano *moteur canon* is illustrated.



range, and Fonck claimed to have brought down no fewer than eleven aircraft with this single-shot weapon. As early as 1918, however, the Spad *moteur canon* combination was discarded for air interception. In 1920, the American Wright Company acquired a licence for engine and gun; after some experimentation, the matter was dropped. The engine suffered badly from vibration; the muzzle velocity of the gun was poor; and the rate of fire too low to be practical. Moreover, flying and aiming the aircraft whilst loading the gun at the same time required an uncommon skill in the pilot. In addition, the impact fuse of the shell proved insufficiently sensitive to detonate on the aircraft then in use. The maximum rate of fire has been stated to have been no more than two rounds per minute.

On the German side, two interesting developments deserve mention. One was the 20 mm special aircraft shell-gun of the Stahlwerk Becker A.G. This was a fully automatic weapon which daringly used the "free blow-back" principle known in automatic pistols, i.e., with no mechanical locking of the breech during the firing of the round. The gun fired impact-fused shells, and was designed for the attack of ground or sea targets such as tanks and submarines. A few of these guns were operationally tried in twin-engined aircraft and seaplanes. In 1919, the Becker gun was transferred to the Swiss Oerlikon firm, and there further developed with the aid of German technicians. In 1933, Hispano-Suiza acquired a licence for the Becker-Oerlikon gun with its improved ammunition, and modified it for combination with a twelve-cylinder engine, to fire through the hollow airscrew shaft. The main difference from the 1917 *moteur canon* was that this time an automatic gun was compounded with the engine. Now, moreover, the long barrel could be retained, thanks to the length of the twelve-cylinder engine. In 1938, private enterprise in this country acquired a licence for this engine-compounded gun. Previously, in 1934, the Luftwaffe had introduced the Oerlikon shell-gun for air combat, transferring production back to Germany. A combination with an engine to fire through the airscrew hub, too, was developed and accepted for service.

The second development was the 20 mm Szakats shell-gun of the Eisenach Waggon Works. This was primarily intended for air combat; it was more refined than the Becker design, but its development was never completed. Among features valuable in air combat, it had an ingenious device to adjust time fuses continuously during firing. This did away with the necessity for rather doubtful, dangerous and inefficient impact fuses previously used. It was, in fact, the first approach to an air-combat proximity fuse.

(To be continued)

SAFER COCKPIT HOODS

THE speeds and altitudes attained by modern fighters have introduced many detail difficulties, the importance of which may, nevertheless, be critical. Such a difficulty was experienced with Perspex cockpit hoods which, owing to the difference in coefficient of expansion between the Perspex and the metal frame, were found to be liable to fracture as a result of the great temperature change occasioned by the high rates of climb and dive now common.

A solution to this particular problem has been found by the Triplex Safety Glass Co., who have successfully developed a method of bonding Perspex to rubber. The bonding of rubber to metal has, of course, been common practice for some considerable time.

The first aircraft to be fitted with a hood employing the new development is the Hawker Sea Hawk. Comprehensive tests of the hood were made prior to the decision being taken to specify it for production aircraft. Examples of rubber/Perspex bonding, together with example of bullet- and bird-proof windscreens and pressurized windows, will be shown on the Triplex stand at the S.B.A.C. Exhibition at Farnborough next month.

HOLLYWOOD MAKES AMENDS

NO matter whether, technically, one may recognize that inter-stellar space travel is a possibility within the foreseeable future, the fact remains that the subject still has all the earmarks of fantasy, and it is difficult to persuade oneself not to dismiss the whole subject as being utterly impossible. Disregarding, for the moment, any trafficking with practicalities, a new Technicolor film, *Destination Moon*, offers absolutely first-rate entertainment in telling of a journey to the moon and back in an atomic-rocket-powered space-ship.

Technically, the film is truly exceptional. We freely admit to attending the preview in some past-conditioned spirit of scepticism; but as the story unfolded itself, it became evident that, for once, the scientific advisers had been allowed to do their job seriously. Naturally, the picture is intended primarily as entertainment and to this end one must make due allowance for dramatic licence and over-simplification; even so, one was not conscious at any time of the technical fidelity having been debased to "human interest." Opening to-day, August 24th at the Leicester Square Theatre, London, for a three- to four-week season, *Destination Moon* will be generally released on September 25th.

C. B. B-W.

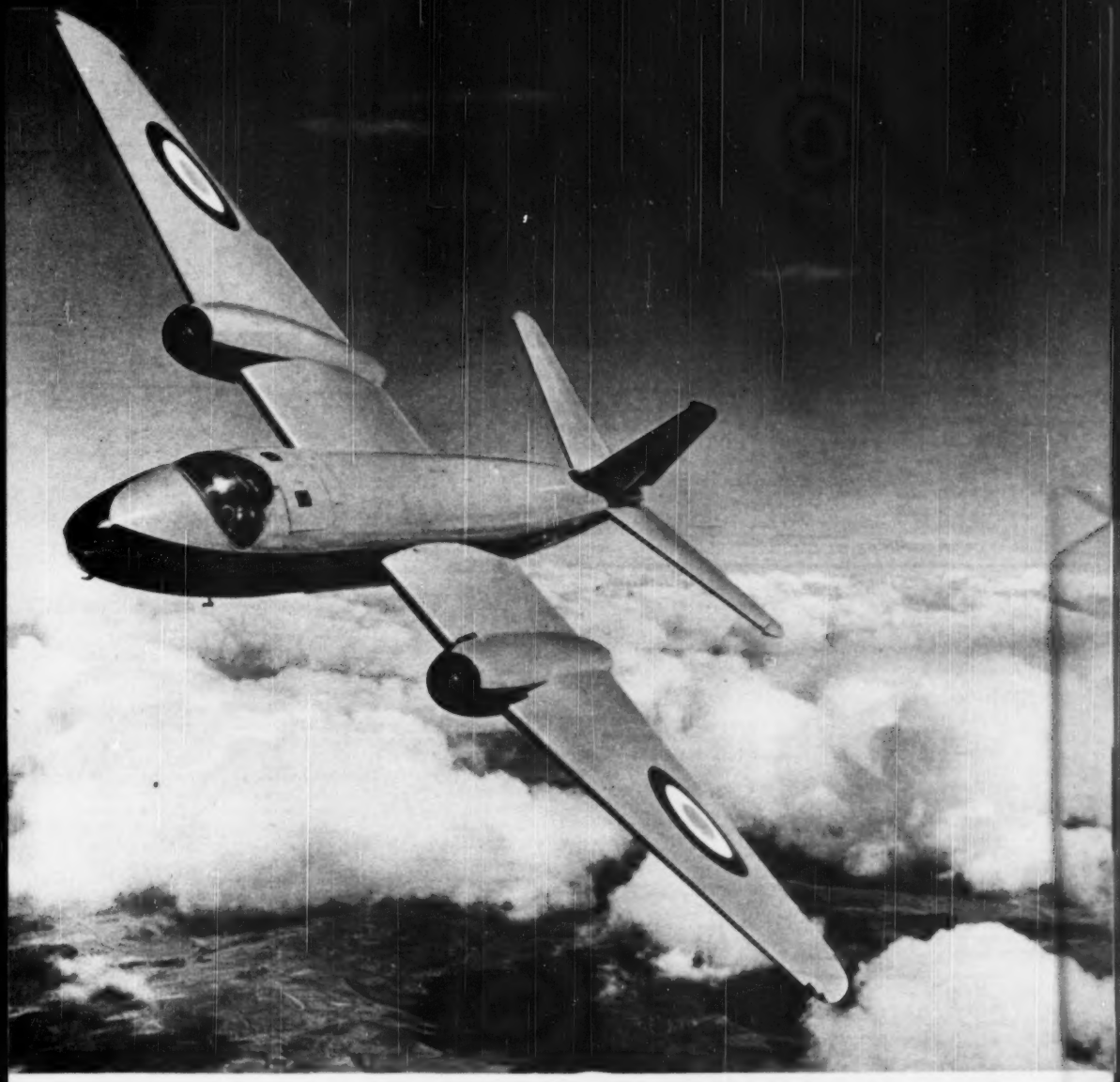
BOSCOMBE TEAM: R.A.F., R.N. and CIVILIAN STAFF

Speaking at last year's Aircraft Constructors' Annual Dinner at the Aeroplane and Armament Experimental Establishment, Boscombe Down, Sir Roy Dobson referred to the "unique fellowship" existing between the industry and "Boscombe." Portrayed below are the flying personnel and engineer officers who are at present charged with the furtherance of the great A. and A.E.E. tradition.

Front Row (left to right)—Lt. J. Robertson; S/L. B. G. Aston, D.F.C.; F/L. R. L. Duncan, A.F.C.; G/C. H. A. Purvis, D.F.C., A.F.C.; W/C. P. G. Wykeham-Barnes, D.S.O., O.B.E., D.F.C.; F/L. W. E. Wiseman, D.F.C.; G/C. H. P. Broad, C.B.E., D.F.C. (Superintendent of Flying); W/C. W. J. S. Barnard, O.B.E.; W/C. D. E. Davies, D.F.C., A.F.C.; Lt. Cdr. G. R. Callingham, S/L. R. A. Watts, F/L. A. S. Brain, A.F.C.; F/L. W. D. Hunter. **Second Row.**—F/L. J. A. G. Beadle, F/L. P. S. Geen, F/L. E. A. J. Haskett, F/L. D. Phillips, F/L. C. H. A. Mitchell, Sig. I. Bainbridge, Eng. I. Flower, F/O. D. F. Mackie, F/L. J. R. Hemsworth, F/L. L. W. E. Mossan, Mr. J. E. Palmer, D.F.M.; Mr. R. A. J. Steel, F/L. G. W. Johnson, F/L. C. A. Hoddor. **Third Row.**—Lt. Cdr. R. M. Orr-Ewing; S/L. R. F. W. Cleaver, D.S.O., D.F.C.; F/L. W. J. L. Sheahan, D.F.C.; S/L. A. E. Callard, D.F.C.; S/L. I. N. M. MacDonald, Lt. Cdr. H. C. N. Goodhart, Lt. D. G. Parker, D.S.O., D.F.C.; F/L. S. J. Perkins, Mr. I. G. Murdoch, Mr. J. G. Killikelly, Mr. J. W. Mills. **Back Row.**—F/L. D. White, D.F.C.; S/L. L. W. F. Stark, D.F.C., A.F.C.; F/L. A. D. Woodcock, F/L. C. G. Clark, D.F.C.; Lt. R. H. Reynolds, D.S.C.; Lt. Cdr. G. Rawden, S/L. P. L. Parrott, D.F.C.; F/L. L. S. Lumsdaine, D.F.C.

CANBERRA

ANSWERING, like the thoroughbred she is, to the slightest control movements by W/C. Roland Beamont, D.S.O., D.F.C., the Canberra B.1 (two Rolls-Royce Avons) is variously portrayed by *Flight* photographer L. W. McLaren, working from an R.A.E. Lancaster. This version of the English Electric jet bomber should be established in R.A.F. service within a few months. Points to note are the offset bomb-aimer's panel and beautifully moulded cockpit canopy, and—in the view at the foot of the opposite page—the finger-type dive-brakes on upper and lower surfaces of the mainplanes.



ELEPHANTASIA

Some Passing Thoughts on Soviet Air Power

By B. J. HURREN

"Flight" has more than once greeted with faint enthusiasm the efforts of writers who seek to assess Soviet air power, and the highly detailed analysis quoted by the author of the present article gives us no inclination to revise our attitude. But Mr. Hurren's treatment makes entertaining reading, and with his concluding sentence we heartily concur.

AN idle thought came to me when considering Brumas, the darling bear of the Zoo crowds, as to whether there was not some cunning propaganda motive connecting the affectionate creature with the symbolic Russian Bear and the Latin root of *Ursus* with U.S.S.R. The chance etymological association is near enough to be interesting, whilst the pretence of affection in a bear is no less a fiction.

For, immediately a war commentator delves into U.S.S.R. statistics, it becomes clear that the proper idea of a symbol for Russia would be an elephant: possibly a rogue elephant, but certainly the largest of animals in the behemoth category.

Everything about Russia is elephantine. Its vast lands (in U.S.S.R. alone 8,700,000 square miles); its enormous population (193,000,000, excluding post-1945 acquisitions); its prodigious memory, trick intelligence, gauche diplomacy, crushing mode of attack, and its fantastic armed forces; all these add up to a living Colossus bestriding so much of the earth.

But, as will be shown, there is another reason for symbolizing Russia as an elephant: the dispositions it must make to hold its frontiers—and possibly to enlarge them.

First, it is necessary to dispel the deeply rooted notion of the world as seen on Mercator's projection in nearly every schoolroom. Globally, Russia is completely surrounded: from a window in Moscow, whichever way the head is turned, or whatever window is used, on all sides lie political and religious opponents.

Imagine, then, the outlook of a defence chief in Moscow. Let us follow his thoughts around the ring. (For the unimaginative I have ventured a Thurberesque drawing of the Russian Elephant.)

The world can be seen in new garb and description. Starting arbitrarily, we see the Scandinavian Flap, comprising Finland-Sweden-Norway-Denmark, which makes the ear of the elephant—a very sensitive, twitching ear. Then, adjacent, is Benelux, which gazes hopefully at the Western Pool of England and France. Anti-clockwise, we see Cultured and Catholic (Spain, Portugal, Italy) in a group; and far across the waters the Sunset Sams—very powerful and thrusting chaps, these men of the West. To the south, the Tango Territories of Latin America, on a sort of appendage to the world; and across more water the vastly empty yet vastly immense Sunkist Territory of All Africa. Next to Italy, but so far away, is Drurylania, that Balkan nightmare, so close in oriental intrigue to Kismetia (Turkey, Near East and Egypt). Savage Parthia—unchanged since Roman legions bit the dust of modern Iraq, Persia, Arabia and Baluchistan—abutting Hillbillia, where dwell Wazirs, Pakistanis, Tibetans, Kashmiris (not to mention Abominable Snowmen), each presenting its own headache to the Kremlin Watcher. Then the sub-continent of Dravidia, home of Hindoo and (strangely) Indonesian—together aggregating nearly 600,000,000 people. To the East, further, lies Templebellia, or Burma-Siam-Indo China-Malaya. Next, that vast ant-hill of humanity vaguely termed "China" but more descriptively here named Junkasia—one man in every five in the world is a Junkasian! And so we complete the circuit to Japkor and the Pacific up as far as Alaska, where the Sunset Sams abound again.

Indeed a gloomy outlook from Moscow! Not a friend anywhere, except in Junkasia and Central Europe, which shook off one supreme dictator in order to accept a committee of dictators!

But, on second thoughts, not quite so gloomy from a military viewpoint. Indeed, by far the greater part of the world is of no military significance whatsoever. For example, if the Western Pool and the Sunset Sam territory were overcome, then a "holding" force, mainly of air power, is all that is required. The question is twofold: (1) How to overcome the Western Pool and Sunset Sams; and (2) how big should the holding force then be?

Unfortunately, the Western Bloc has an atomic bomb—unfortunately, because Russia has an inconveniently large number of big cities. Moscow rates 4,137,000 people; Leningrad 3,191,000; nine cities exceed 500,000; 16 more exceed 250,000; 54 more top 100,000; 41 others top 75,000; and 51 further exceed 50,000. We (says the observer in Moscow) have built 475 new towns since 1939, and despite the ravages of war we are expanding and cannot afford atom attack. Therefore, we must have one helluva defence air force before moving to a holding force.

Russian statistics are complicated, and information "in short supply." But Dr. Steinberg, a Fellow of the Royal Historical Society, seems to marshal available facts concisely and (to me, at least) convincingly. The army, he opines, consists of 150 divisions, 120 of which are "home" troops and each 10,000 strong, whilst 30 are "foreign" units each 20,000 strong. These divisions make up six armies, each zoned for localized warfare. In the "home" divisions are 30 (i.e., one-quarter of the total) which are army air force and airborne units.

The U.S.S.R. air forces are integral parts of the army and navy, and form two divisions—one for the west, one for the east. In addition, there is an independent air striking force which comes directly under the supreme command. The army air force musters 500 "regiments" of 30-35 aircraft each, giving a grand total of about 17,250 aircraft. The naval air force, mainly of fighters, is shore-based, operating under naval local commanders and musters 2,000 aircraft, chiefly fighters.

Detailed estimates are cautiously put forward as: first-line air forces, 14,000; immediate reserve, 10,000. Of these, some 5,000 are jet fighters; 1,500 are torpedo or naval attack aircraft; 1,000 are heavy bombers; and 300 are super-bombers.

To maintain this force, *annual* production is given as: 1,500-1,800 heavy bombers; 3,000-4,000 light bombers; 2,500 piston-engine fighters; 2,500 jet fighters; transport aircraft 1,200-1,400; and up to 4,000 training types.

Now this gives a round figure total of 17,000 for *new* production, annually. Is the Russian air force being replaced annually? After all, our own air force is virtually in a similar state of replacement in every category since 1945, and certainly the new air forces (such as India and Egypt) are replacing 100 per cent, whilst the reju-

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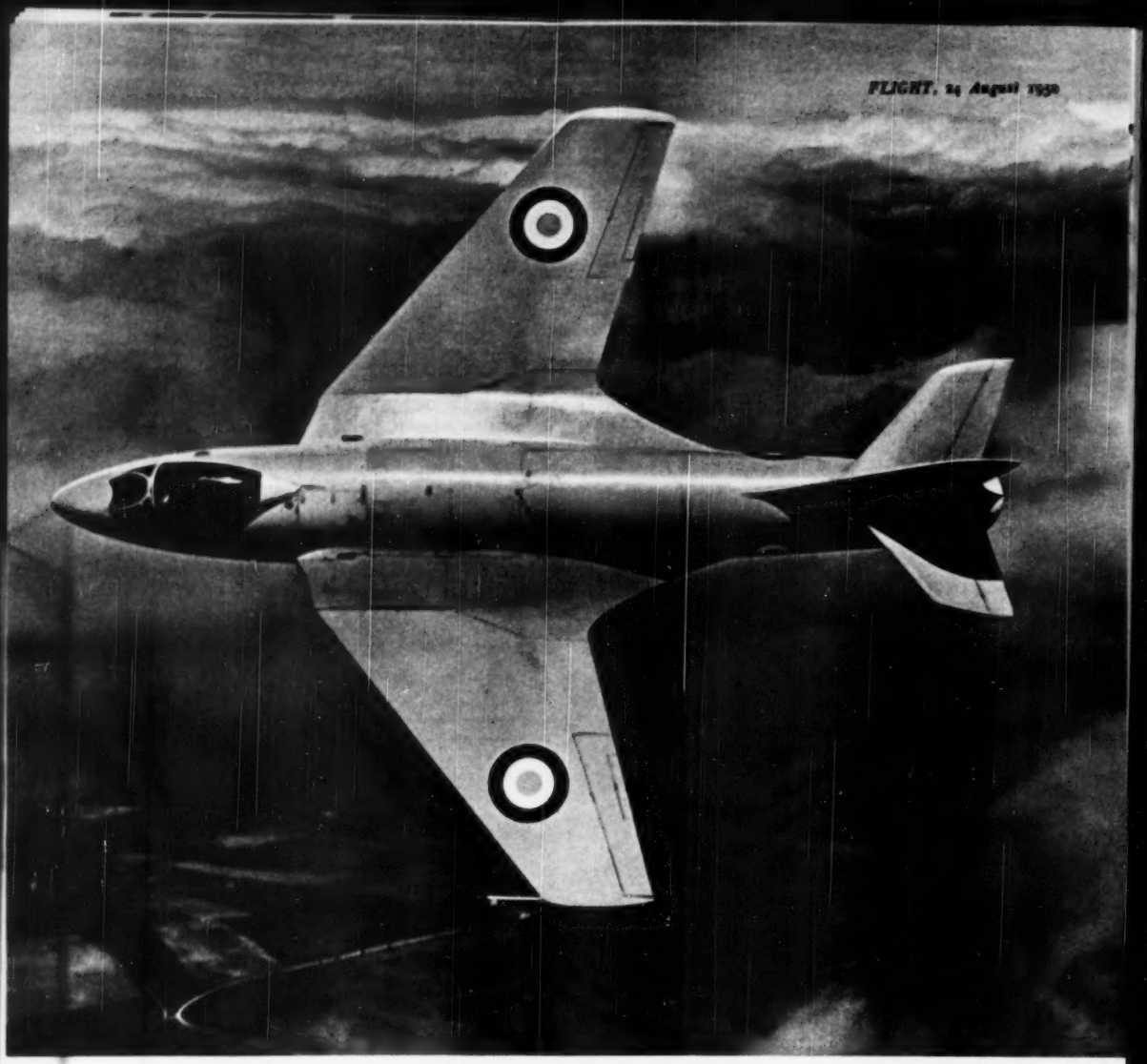

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ELEPHANTASIA . . .

venated or resurrected air forces, such as those of Belgium and Italy, are certainly 100 per cent different from their war footing.

And, be it remembered, to the purely Russian total must be added the output of vassal states such as Czechoslovakia. Hence, we can see the point—made with due caution as to the absence of adequate figures—by Sir Richard Fairey in the recent Wilbur Wright lecture, that Communist-dominated output "is in the order of at least 25,000 and possibly 40,000 per annum." (Mr. Asher Lee gives the higher figure: but his book has been severely criticized by recognized experts for numerous technical mistakes. He could rapidly dispel some of the criticism by stating his sources of information; and since, from a Russian standard, he must be on the spot anyway, it is difficult to see why he does not do more to substantiate his case.)

How to explain this enormous peace-time production? Two possible clues exist: one German, one American. The German clue concerns the staff officer who attributed the failure of the attack on Russia in 1941 to a staff mistake—the staff calculated that one German could account for 14 Russians, but actually 17½ Russians faced each German in battle. Hence the advantage of numbers—already demonstrated in Korea.

Likewise, when the capture of Okinawa was being planned, the logistics experts were asked how many men were needed. Told that there were 80,000 Japs on the island, the Yanks blandly replied they needed 240,001 men to be sure of taking it, thus improving on Napoleon's dictum that the art of War is to have two men where the enemy has one.

The fact is that from the window in Moscow the war would have to be fought not on two fronts (as was the German mistake twice over) but on innumerable fronts with utterly diverse conditions. Hence, an Arctic Air Force, a Temperate Air Force and a Tropical Air Force would divide the *effective* annual production for any one set of conditions by at least three and possibly six (for example, there might at one time be two tropical air wars, one in the Near East and one in the Far East, Southern Sector). And, on that count, it is clear that 40,000 aircraft a year is nothing like enough to give overwhelming air superiority in quantity—let alone quality.

Indeed, we may venture to remind Soviet staff officers in Moscow of a comment made in the German Official History of the War 1914-18; it referred to the "utter impossibility" of keeping pace with British aircraft production *in war*. That statement would have been even more true of American production in 1942-5, and the only thing for every citizen to do now is to ensure that *peace* production does not fall so low that the threat of war becomes possible—and, by a snowball effect, war itself feasible.

A 16,000-ft DELAYED DROP

THE advent of very high-speed, high-altitude flight has produced more than one problem for the parachute designer. If a man bales out at 40,000ft and opens his parachute almost immediately he faces the danger of a long descent in frigid, rarefied air. On the other hand, a long delayed-drop to a reasonably safe altitude might cause unconsciousness. Some simple form of automatic parachute-opening obviously seems desirable, even essential.

Development of such a device has been continued in several quarters for some years, but the Irving Airchute of Great Britain, Ltd., has probably amassed the greatest practical experience with a barometric automatic parachute-release.

Results have been published of a "live" test made on July 31st with the Irving Altimeter Parachute Release Mk 2, in confirmation of data obtained in pressure-chamber experiments at Farnborough. A live body was employed (states the Irving report) to provide a simple and reliable record of operating altitude and to improve the chances of recovering the mechanism for examination if it failed.

Major T. W. ("Dumbo") Willans was the experienced "live body" selected to test the Mk 2. (An account of his descent with the larger, heavier Mk 1 automatic release appeared in *Flight* of November 17th, 1949.)

He jumped at 25,000ft over Netheravon from a Lockheed Lodestar, which had climbed to that height in 25 minutes. The pilot and co-pilot were, respectively, Mr. J. Hartzog and Mr. Leslie Irvin; Mr. J. Hatfield, who designed the equipment, acted as observer, made final adjustments to the release and superintended despatching and aiming—by means of a radio compass tuned to a radio beacon.

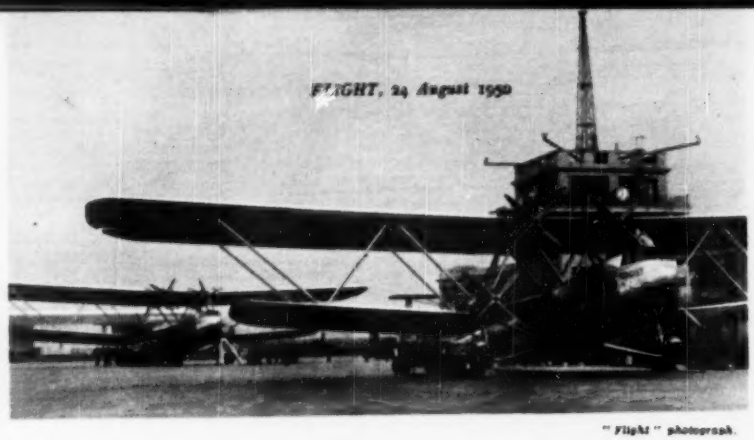
Maj. Willans made his exit with a stop watch strapped to the palm of his left hand, which was held close to the eyes, just above the observer-type reserve parachute. His right hand clasped the left wrist. He fell for the first 15-20 seconds in a constantly changing attitude, and then achieved a back-down position by movement of the legs. Without moving his hands, he was unable to check a clockwise spinning motion—and consequently found it difficult to judge height, as the fields appeared blurred. ("I found it more comfortable," reported Maj. Willans, "to look at the watch.")

After a fall of approximately 71 seconds, the automatic release "clicked" and the canopy blossomed out almost immediately. In the event of failure, the parachutist had planned to pull the rip-cord by manual over-ride after 90 seconds. Having checked that his height was less than 9,000ft, he removed his oxygen-mask to allay a feeling of sickness. The test ended well with a comfortable landing on grass.

Summing up the experience Maj. Willans offered the following conclusions: (1) the altimeter release operated satisfactorily, and within approximately one second of the estimated time; (2) the parachute developed safely, having been automatically released with the body spinning and in probably the least favourable position; (3) opening shock of 28-ft canopy developing at 10,000ft at terminal velocity is not necessarily particularly violent; (4) goggles, which were anti-dimmed inside and out, did not mist during fall; (5) clothing worn was probably unnecessarily heavy; (6) thin leather gloves were adequate protection against cold, and did not restrict movement of fingers; (7) oxygen mask remained in position during free fall and parachute development; (8) oxygen supply was adequate; (9) parachutist was not so tired physically after jump from 25,000ft with oxygen, as after the previous jump with Mk. 1 release from 15,000ft without oxygen; (10) the free fall, while waiting for the automatic release to operate, was more pleasant than the second part of the descent.

Should the parachutist bale out below the height set for barometric opening, the pack is, nevertheless, automatically opened after a pre-set delay of a few seconds.

All set: Maj. Willans carried altimeter, stop-watch, two parachutes and oxygen supply. The barometric release is under his right shoulder.



Hengist and *Heracles*, mentioned in the letter from Mr. Peter Masefield, alongside the Croydon control tower.

"Flight" photograph.

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

CORRESPONDENCE

Service Slang

I WAS interested in Geoffrey Dorman's article in your June 15th issue, entitled "What's in a Name?" in which he discusses the R.A.F. colloquialism for upward rolls.

My two bits, for what they are worth (25 U.S. cents), is that the actual configuration of the manœuvre accounts for these rolls being named after the third letter of the alphabet which, in Service signal parlance, is always "Charlie."

New York. D. CARY-BARNARD.

Hannibal and Heracles

I HAVE been interested to read the correspondence about "the two types of H.P.42" in your columns recently. In these days when the Viscount prototype is introducing a "new look" on the London-Paris route some facts about these historic H.P. aircraft are well worth recalling.

A fact which is not often remembered is that the designation H.P.42 belonged properly only to the four Eastern-type *Hannibal* aircraft equipped for 24 passengers and powered with four 490 h.p. Bristol Jupiter XI.F engines.

The four Western-type *Heracles* aircraft, designed for the London-Paris route and furnished for 38 passengers, with four 555 h.p. Jupiter X.FBM engines and a smaller fuel capacity, were in fact H.P.45s. The machines as built were:

H.P.42. Eastern Type		H.P.45. Western Type	
(1) *Hannibal*	G-AAGX	(1) *Heracles*	G-AAXC
(2) *Horsa*	G-AAUC	(2) *Horatius*	G-AAXD
(3) *Hanno*	G-AAUD	(3) *Hengist*	G-AAXE
(4) *Hadrian*	G-AAUE	(4) *Helena*	G-AAXF

The prototype H.P.42 *Hannibal*, which was also the first production machine of the Eastern type, first flew in October, 1930. With it Imperial Airways inaugurated the world's first four-engine commercial air service between London and Paris, on June 11th, 1931. From 1932 onwards *Hannibal*, together with the other three H.P.42s, operated on Imperial Airways' Indian and African routes based on Cairo.

Meanwhile, the first H.P.45, *Heracles*, of the Western type, had flown for the first time on August 13th, 1931, and started operating the Paris service in the following month. *Heracles* flew more than 13,000 hours during the following nine years and carried more than 100,000 passengers. During 1935 its utilization was 2,500 hours and it flew on *all* but four days during that year! Quite an achievement.

In between the H.P.42 and the H.P.45 came the H.P.43, which was a three-engine bomber-transport version of the H.P.42, and the H.P.44 (Hinaidi development).

Two of the H.P.45s—*Hengist* and *Helena*—were converted to Eastern (H.P.42) standard and were based on Cairo during 1933 and 1934. *Hengist* was eventually burnt accidentally on the ground at Karachi in 1936. The remaining two H.P.45s, *Heracles* and *Horatius*, continued on the European routes and were joined there for a time by the H.P.42 *Hanno* during 1937.

All the remaining Cairo-based aircraft, with the exception of the gallant old *Hannibal* itself, which was lost with all hands in the Arabian Sea early in the war, returned to the U.K. in 1940 and were eventually scrapped. They had all flown more than 12,000 hours.

I trust that our new Ambassadors and Viscounts in B.E.A. will eventually build up a no less distinguished record—as the present Vikings are well on the way to doing.

PETER G. MASEFIELD, Chief Executive.

Ruislip, Middlesex. British European Airways.

Sidewash and Stability

WITH reference to H. K. Millicer's article on "Sidewash and Stability" (*Flight*, July 27th 1950) it would appear that there is an error either in the formula $\frac{S_{FR} \times L_{FR} \times L_{FF}}{S_{FP} \times S_{FS}}$ as printed, or in the definitions. I have applied this formula to the Hawker P.1040 and P.1052 and have obtained 2.68 and 2.97 respectively, compared with 1.21 and 1.04 stated in Table II of the article. My results are based on the following values:

	P.1040	P.1052
S_{FR}	20.8 sq ft	20.8 sq ft
L_{FR}	19.5 ft	18.4 ft
L_{FF}	11.2 ft	10.0 ft
S_{FP}	38.0 sq ft	33.0 sq ft
S_{FS}	44.5 sq ft	39.0 sq ft

While agreeing in general with the article there are two points I would like to raise with the author. First, he mentions the possible c.g. positions for stability of an isolated fuselage with various types of nose, whereas in practice an isolated body is inherently unstable, even with the yawing axis at the nose. The other point concerns the criterion itself. A good deal is made of the influence of the nose shape on the stability of the aircraft as a whole and yet the empirical formula suggested takes no account of this shape but is based on overall dimensions only.

Although this criterion is worked out for a large number of aircraft no indication is given of the degree of stability or instability present in each case. Hence it is impossible to assess the merits or demerits of the formula.

Finally, I feel that aircraft design has reached the point where empirical rules of thumb are not sufficient and every layout must be assessed on its own merits utilizing the best available technical data, especially if the aircraft under consideration will be operating at high mach numbers.

P. W. WREFORD-BUSH, Project Engineer.

Kingston-on-Thames, Surrey. Hawker Aircraft, Ltd.

[We understand that Mr. Millicer is now on his way to Australia, so there may be some delay in receiving his comments on Mr. Wreford-Bush's letter.—ED.]

Enthusiasm Discouraged?

IN view of the manpower shortage in the R.A.F. and its reserves, it would be of great interest to know how many "keen types" have experienced the same difficulties as I have in attempting to join an Auxiliary Squadron. Soon after leaving the Service I wrote to the adjutant of a certain unit requesting details of service and an enlistment form, if any. After considerable delay I received a typed slip to the effect that all the information I desired would be found in an "enclosed leaflet"—needless to say, no leaflet was enclosed.

Some time later I presented myself at what (according to a board outside) purported to be the H.Q. of a certain other squadron, and a F.C.U. After completing the enlistment form, I found at my subsequent interview that the flying squadron had only very vague connections with the building, and I was advised by the adjutant of the F.C.U. to write direct to the C.O. of the flying squadron where my services could be more fully used. This I did, and three weeks later (August

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CORRESPONDENCE . . .

8th) I am still awaiting a reply. Perhaps a mere ex-airman, with three Group I and II trades entered in his release book and nearly five years' service is not of sufficient value to the R.Aux.A.F. to warrant consideration? Although the F.C.U. would have enlisted me as a fitter M.T., I feel I should be better employed as a fitter IIE.

Surely something is radically wrong when a prospective recruit has to positively search for an approach when offering his services to the country. A. G. BOLTON.

London, N.7.

For the Sports Pilot

NO flying club exists to-day which caters solely for the sports pilot and his needs; in fact, those few sports pilots who fly to-day usually own their own aircraft and are, therefore, independent of the clubs. The needs of the young sports pilot are not fully realized and mistaken ideas are present among the older pilots, most of whom have lost the initial thrill of air racing and the first loop. The present-day flying clubs and groups are performing miracles in keeping their machines in the air, although their charges are a severe drain on the 'teen-age pilot's income. Whatever the financial position is, it must be admitted that dual instruction at clubs to-day cannot be safely replaced by any other unorthodox training and the would-be sports pilot must spend at least fifty pounds before he is fully confident with his particular type of aircraft.

The writer puts forward a new (?) question—what of the new 30-40-hour licence requirements? Many young pilots pass through their first solo only after feeling the pinch financially, further flying being only a question of hard cash.

Recently many civil pilots flew the Fairey Junior, which may solve the problem of cheap solo flying for the new licence renewals. It is with this object in view that I am organizing a small group of ten or so enthusiasts in an attempt to secure the Chilton monoplane (32 h.p. Carden-Ford). The writer, being a member of the Ultra-Light Aircraft Association, is able to start serious spade-work immediately, and assistance is being offered by this Association. The group (to be known as the Midland Group of Sports Pilots) is to consist of seven private pilots and three student pilots. All student pilots will need to pass flying tests, and flying hours must be near the Private Pilots' Licence requirements, i.e., 30-40 hours' dual and solo flying.

Flying will commence when the requisite number of members are enrolled, all activities being centred in the Coventry-Birmingham-Leicester area. Negotiations are going ahead for such necessities as hangarage, insurance and a loan from the Kemsley Trust. Membership for life will be available for the modest sum of £5, together with a weekly subscription of half-a-crown. All flying undertaken by the group would consist of aerobatics and precision manœuvres needed for air racing, cross-country flights, etc.

Any pilots residing in the Warwickshire and Leicestershire areas are invited to contact the writer at 24, Edward Road, Keresley, Coventry, Warwicks. LEWIS G. COOPER.

Coventry.

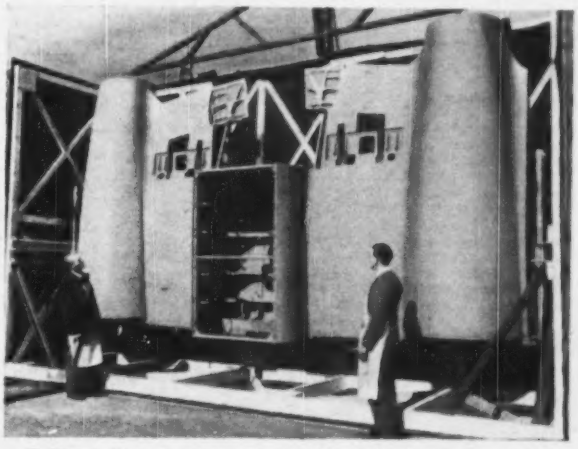
MERITS of the CASE

Packing Aircraft and Parts

FROM the manufacture of dog biscuits to the specialized packing of aircraft and their components for export is a far cry, but between these extremes the firm of Export Packing Service, Ltd., Sittingbourne, Kent, has travelled.

Some years ago, two sons of a farmer (R. C. and E. C. Boucher) purchased a small dog-biscuit business in Kent. During the war the concern was asked to help in producing Army rations and requested to make special packages which would ensure arrival and storage in any part of the world without deterioration. The brothers became so intrigued by the packing problems involved that a new company was formed and gradually a great variety of goods was accepted for treatment, two of the most numerous items being radio and radar apparatus. Finally there came a request to handle aircraft parts and complete aircraft.

This side of the business has grown tremendously. Components and ancilliary equipment of aircraft, many bearing names familiar in the industry, are to be seen at the works awaiting scientific packing to ensure flawless arrival at their destination. For the bigger components, such as wings, fuselages, centre-sections and undercarriages, it has been found necessary to install a design staff to produce packing cases which will withstand warping, twisting, adverse atmospheric conditions and bad handling by transport companies.



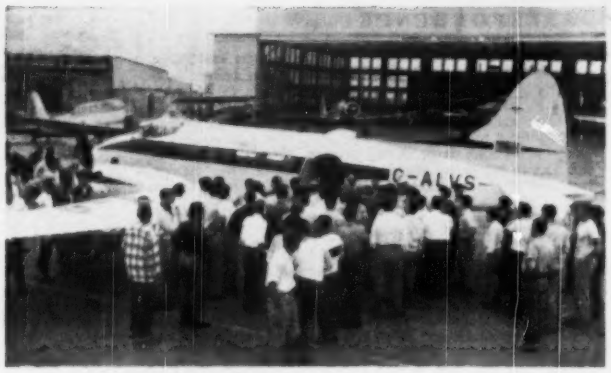
A Gloster Meteor centre-section installed with allowance for limited movement to counteract stresses set up by any mishandling of the case.

Fuselage sections, each suspended at two points on sponge rubber on an inner framework. The sections will at no point touch the outer casing.

Sponge rubber, plastics and other shock-absorbing materials are all used in their appropriate places, but much skill and ingenuity is employed in suspending the packed component in such a manner that the outer cases can suffer quite considerable deformation without the contents being strained in any way. A not inconsiderable part of the task is the production of labels and cardboard boxes for small items, the final packing of which often entails dipping in hot wax to exclude air and moisture. Each layer of protective covering bears a label giving full details of the contents, and no package need be touched until the moment the parts enclosed are required for use.

In many ways the designing firms of the aircraft industry are now dependent upon outside specialists, and this packing service appears to be another case where accumulated "know-how" is to the advantage of the industry generally.

CIVIL AVIATION NEWS



BRITISH AMBASSADOR: Deep interest was displayed by students of the Northrop Aeronautical Institute in the DH Dove belonging to the British Embassy in Washington when, recently, it visited Hawthorne, California. The Dove is being demonstrated throughout the United States to acquaint executives and technicians with its design characteristics.

U.S. MERGER SETTLEMENT

BY a decision of the United States Circuit Court of Appeals, the long and bitter dispute over the merger of P.A.A. and A.O.A. has at last been settled. The final application by T.W.A. and other opponents for a restraining order and a review of the C.A.B. decision was dismissed, and the way is now clear for the merger to be put into effect.

T.W.A. has announced its intention of beginning preparations immediately to serve London and Frankfurt. This company operates the largest standardized fleet (61) of Constellations in the world and has now placed an order with the Lockheed Aircraft Corporation for six further Model 749-As, of which delivery is expected early next year. A new district sales office was recently opened in Brussels.

At P.A.W.A.'s annual stockholders' meeting on July 20th the company's president, Mr. Juan T. Trippe, said that steps were well under way to integrate A.O.A. equipment and personnel into Pan American's Atlantic operations. The services of the two companies will continue under separate management for the interim period necessary to complete legal formalities.

Commenting on the merger, the *New York Journal of Commerce* considers that it will result in more, rather than less, competition between U.S. airlines on the Atlantic route. An article points out that P.A.A. originally based its merger case on the fact that there were too many carriers on this route and that unnecessary competition was costing the Government an excessive amount in adjusted mail pay. Now, however, the number of American services to Europe is even to be increased, with duplication at Paris and Rome.

JET-BOOSTED DC-6

THE Douglas Aircraft Company is reported to have evolved a plan for installing Westinghouse J-34 turbojets and wing-tip fuel tanks in its standard DC-6s. It is claimed that speed would be increased to more than 400 m.p.h. as compared with the present maximum cruising speed of 300 m.p.h. The jets would be slung under the wings in "pods" and would add the equivalent of about 6,000 h.p. to the figure of 10,000 h.p. made available by the four Pratt and Whitney R-2800 series engines.

Douglas designers consider that this power augmentation could be available over a range of about 1,700 miles, sufficient to cross the United States from coast to coast with only one intermediate stop.

Some details of proposed "jet-pod" application to other American airliners were given in *Flight* of May 4th.

THUNDERSTORM FLYING

A REPORT by B.E.A.'s Research and Special Developments Department on lightning discharges experienced by Corporation aircraft up to the end of 1949 is contained in the current issue of the *B.E.A. Magazine*. The article lists a number of rules and pointers which should be adopted by pilots faced with the prospect of flying through cu-num areas, and is based on information obtained from the United States *Thunderstorm Project* (see *Flight* of January 12th) and the B.E.A. *Analysis of Lightning Discharges*.

The department reports that 86 cases of lightning discharges occurred on Vikings and Dakotas in three and a half years. A great number of these incidents took place over coastal areas or high ground, especially when cold fronts or occlusions were present. Most cases are said to have occurred in cloud—often apparently of the harmless stratus type which actually concealed a cumulo-nimbus interior. It is thought possible that the installation of the dry-wick dischargers on Vikings helped to reduce the number of incidents in which these aircraft were involved.

In the great majority of cases the trailing aerial was lost, a fact which confirms the view that an extended aerial increases the chances of a strike.

The department agrees with the American view that there is no authenticated instance in which anything but minor damage has been experienced by a well-bonded metal aircraft. The radio equipment is most affected although minor damage to the airframe frequently occurs. A temporary blinding of the pilots, especially at night, is also mentioned. Automatic earthing devices are being developed to protect the V.H.F. equipment on Vikings, which has often suffered.

B.E.A. considers that, in general, "the bark of lightning is worse than its bite" but that the minor damage often incurred can be a costly item. In this connection, the possibilities of fitting expendable rod-type conductors to the more vulnerable extremities, such as wing tips, are now being considered.

Severe turbulence is regarded as the most serious of the hazards of flying through thunderstorms, but it is thought that this hazard can be most safely dealt with by choosing a suitable cruising speed for penetrating the storm and then flying the aircraft manually on attitude rather than attempting to "chase" a speed or height reading.

AIRPORT-DESIGN CONFERENCE

NEW developments in ground facilities for air-traffic control and for passenger and cargo handling will be the subject of a conference to be held as part of the 1950 summer session at the Massachussets Institute of Technology from September 12th to 14th. The conference is attempting to explore the most critical current problems in airport design and operation. It is being sponsored by the C.A.A., Port of New York Authority, and Massachussets Institute of Technology.

More than twenty papers are to be delivered by such well-known American aviation authorities as D. W. Rentzel, the Administrator of Civil Aeronautics, P. H. Stafford, in charge of C.A.A.'s airport planning division, and Charles Froesch, chief engineer of Eastern Airlines. It is expected that the proceedings will be published at a later date.

B.E.A. IN JUNE

WRITING in the current issue of the B.E.A. magazine, Mr. Peter Masefield, the chief executive, gives details of the Corporation's activities in June when a £9,145 profit was achieved, as compared with a loss of £35,814 in the corresponding month last year. The comparative statistics reveal some encouraging improvements in operations. Revenue increased by 32.8 per cent, whereas expenditure rose by only 24.4 per cent. The largest increase (70.2 per cent) is that in the amount of freight, which rose from 453 tons in June, 1949, to 771 during the same month of the current year.

The overall deficit for the twelve months ended June 30th

fell from £2,278,100 to £1,196,095, an improvement of 47.5 per cent. The chief executive considers that B.E.A. is likely to remain "in the black" for the rest of the summer months.

In the same article Mr. Masefield gives details of how increased reliability and savings in fuel and money were effected by limiting the maximum cruising-power settings of the engines in the Corporation's Vikings and Dakotas. The new figures are 850 and 650 b.h.p. for the Hercules and Twin Wasp respectively.

The Viking timetables are scheduled on 770 b.h.p. per engine (giving a 196 m.p.h. cruising speed at 5,000 ft), whereas those for the Dakotas are scheduled on 550 b.h.p. per engine (giving 160 m.p.h. at 5,000 ft). Additional power is then available in each case to increase speed to meet headwinds, or to offset delays. The reduction in power used and improvement in punctuality is said to have reduced B.E.A.'s fuel bills by some £5,000 in June alone, apart from further savings which accrue from improved engine reliability and lower maintenance costs.

British Airways Operating Statistics for April, 1950

(Figures for the corresponding period of 1949 are given in parentheses)

	B.O.A.C. All Areas	B.O.A.C. Western Area	B.O.A.C. Eastern Area	B.O.A.C. South American Area	B.E.A. All Divisions	B.E.A. Continental Division	B.E.A. British Division	B.E.A.'s Associates
Revenue a/c-miles	2,167,947 (2,550,564)	332,613 (292,295)	1,395,605 (1,780,591)	439,729 (469,678)	1,569,381 (1,195,826)	1,166,284 (795,128)	403,097 (400,698)	100,105 (15,520)
Total h/c-miles	2,482,636 (2,746,489)	399,068 (313,680)	1,612,456 (1,915,766)	469,112 (517,043)	1,595,354 (1,227,081)	1,180,956 (810,632)	414,398 (416,449)	— —
Revenue passengers	13,722 (12,876)	2,695 (2,810)	8,277 (8,019)	2,750 (2,047)	66,374 (51,618)	39,255 (22,813)	29,119 (28,805)	1,879 (622)
Revenue pass.-miles	39,558,436 (33,714,780)	8,636,225 (5,639,118)	26,779,885 (25,576,175)	4,142,326 (2,499,487)	20,249,951 (14,893,476)	15,125,676 (9,912,085)	5,124,275 (4,981,391)	350,753 (33,748)
Available seat-miles	71,955,911 (50,154,081)	17,574,081 (7,692,761)	40,769,660 (36,594,150)	13,612,170 (5,867,170)	32,760,878 (24,967,121)	24,037,380 (16,930,491)	8,723,498 (8,036,630)	1,011,126 (94,340)
Rev. load factor (pass.)	55.0 (67.2)	49.1 (73.3)	65.7 (69.9)	30.4 (42.6)	61.8 (59.7)	62.9 (58.5)	58.7 (62.0)	34.7 (35.8)
Cargo (tons): Mail	137.0 (142.8)	27.4 (27.8)	95.0 (99.5)	14.6 (15.5)	332.0 (273.3)	229.8 (181.9)	102.2 (91.4)	0.3 —
Freight	330.8 (311.5)	51.9 (52.4)	225.9 (215.5)	53.0 (43.6)	705.6 (424.9)	527.5 (303.0)	178.1 (121.9)	166.2 —
Rev. load ton-miles	5,792,871 (5,077,879)	1,089,602 (770,726)	4,047,549 (3,801,508)	655,720 (497,645)	2,120,228 (1,560,189)	1,669,079 (1,132,387)	451,149 (427,802)	36,259 (2,707)
Usable capacity ton-miles	10,521,043 (9,818,980)	2,034,079 (1,306,427)	6,527,347 (6,312,207)	1,957,617 (2,200,346)	3,667,859 (2,761,467)	2,863,681 (2,004,725)	804,178 (756,742)	143,131 (8,011)
Overall rev. load-factor	55.7 (57.4)	53.9 (60.2)	62.8 (60.6)	33.9 (38.8)	57.9 (57.3)	58.4 (56.9)	56.2 (58.3)	25.3 (33.8)
Total revenue hr	10,080 (13,464)	1,373 (1,332)	6,720 (9,441)	1,987 (2,691)	10,496 (8,231)	7,128 (4,809)	3,368 (3,422)	778 (163)
Total non-revenue hr	1,624 (1,224)	333 (117)	1,101 (777)	190 (330)	769 (615)	108 (99)	110 (146)	— —
Equivalent annual utilization (rev. hr per a/c)	1,401 (1,277)	— —	— —	— —	1,447 (1,233)	1,837 (1,420)	1,001 (1,040)	— —
Unduplicated route-miles	70,052 (81,447)	6,911 (7,700)	46,113 (54,202)	17,028 (19,545)	13,152 (13,374)	10,345 (10,432)	2,807 (2,942)	3,298 (515)
Percentage regularity	98.4 (97.5)	97.2 (98.2)	99.0 (97.2)	97.5 (98.1)	98.1 (96.4)	98.1 (96.1)	98.2 (96.6)	100.0 (94.1)
Average stage (miles)	1,089 (1,017)	1,338 (1,078)	1,099 (1,040)	933 (884)	222 (202)	358 (343)	112 (111)	131 (69)

DURING April the British Airways Corporations and companies operating under associate agreements with B.E.A. carried a total of almost 84,000 passengers, representing an increase of 29 per cent on the total for April, 1949. The passenger-mileage figure amounted to some 60 million—an increase of 24 per cent—and freight and mail ton-mileage rose by 16 and 7 per cent respectively.

Of these totals, B.O.A.C. carried 13,700 passengers and flew almost 40 million passenger-miles, 4 million of these being on the routes in the South American area formerly operated by B.S.A.A. This latter figure was an increase of 66 per cent over that for the corresponding month of last year.

Of B.E.A.'s 20 million passenger-miles, 15 million were flown on Continental routes, where traffic was 52.6 per cent greater than in 1949. A spectacular increase (74 per cent) was also seen in the freight-tonnage figure for the same routes. Both Corporations are now achieving improved figures for equivalent annual utilization. In April aircraft of B.O.A.C. and B.E.A. were flying at the rates of 1,401 and 1,447 revenue hours per aircraft respectively.

Following the merger of B.S.A.A. with B.O.A.C. on August 1st, 1949, the Corporation was re-organized into three administrative divisions in December. No divisional figures therefore exist for April, 1950. To maintain some comparison with earlier periods, the total statistics for B.O.A.C. are divided into three geographical areas which correspond broadly to the regions formerly served by the Eastern, Western and South American Divisions.

BREVITIES

A BILATERAL air agreement is reported to have been signed by Egypt and France.

* * *

On the occasion of the 129th anniversary of Peru's independence, a representative of B.O.A.C. was presented with a gold medal and scroll by the Mayor of Lima. The presentation was to mark the opening by the Corporation of an air route between Peru and Europe.

* * *

The rapid growth of Airways (India), Ltd., is shown by the fact that revenue passenger-mileage has increased from 4,881,000 in 1947 to 17,467,000 in 1949. The company operates twelve DC-3s and two D.H. Doves.

* * *

Issued by the Meteorological Office, *Professional Notes No.* 102 discuss the general weather conditions associated with Khamsin depressions along the Mediterranean coast of Tripolitania, Libya and Egypt. The origin and characteristics of various sand-storms are given, together with a tentative classification into areas of districts between Tunis and the Canal Zone which are affected by such storms. The pamphlet is obtainable from H.M. Stationery Office, price 4d.

Air France is now offering a four-day excursion fare from London to Le Touquet, valid at week-ends and mid-week, for £5 15s. This is believed to be the cheapest return rate between London and the Continent.

* * *

Two of Aquila Airways' Hythe flying-boats have been equipped with G.E.C. air-circulation ovens to permit passengers on the 9½-hour flight from Madeira to Southampton to be served with hot meals.

* * *

The Australian Department of Civil Aviation has granted a permit to the Netherlands Government to make a series of charter flights between Dutch New Guinea and Darwin. K.L.M. will operate these services, which will, in effect, provide a link between New Guinea and the international routes passing through Darwin.

* * *

According to the New York Journal of Commerce, a shortage of nylon for hosiery is likely to reduce the volume of American transatlantic cargo traffic by one half. A leading airline executive has commented: "Present air cargo operations show too great a dependence upon a single commodity . . . the

CIVIL AVIATION NEWS . . .

situation is potentially extremely dangerous for all trans-atlantic carriers." Foreign airlines are said to have made considerably greater gains than American companies in trans-atlantic cargo operations this year.

* * *

Swissair announces considerably improved traffic for the first half of this year as compared with the corresponding period of 1949. Although capacity ton-mileage was increased by only 19 per cent, the number of passengers carried increased by 27 per cent, while freight and mail tonnage rose by 68 and 197 per cent respectively.

* * *

United States airlines deny that the war scare is producing a homeward rush of American tourists from Europe, or that it is causing reservations by intending tourists to be cancelled. Spokesmen for several companies state that, on the contrary, the demand for flights to points in Europe is considerably higher than in 1949. T.W.A., for example, has booked 35 per cent more passengers for September than was the case last year.

* * *

Developed from the former R.N.Z.A.F. station at Harewood at a cost of £400,000, the Christchurch International Airport is due to be opened on December 18th. The Prime Minister of New Zealand will attend the opening ceremony. Although present runway lengths give the airfield an I.C.A.O. "C" classification, the site is capable of expansion to an "A" category airport.

* * *

United Air Lines report that the volume of express and freight traffic has increased 20 per cent in the first six months of this year as compared with the corresponding period of 1949. Although several all-freight aircraft have been transferred for military duties on the Pacific air lift, the company will continue to maintain coast-to-coast "Cargoliner" services.

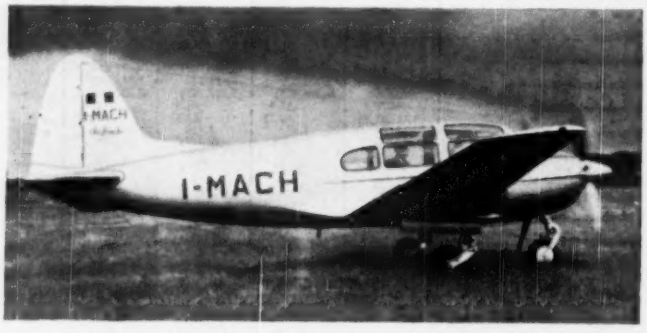
* * *

At the annual general meeting of Aer Rianta, held on July 31st, it was announced that passenger traffic at Dublin Airport in the year 1949-50 had reached the record figure of 212,661. Freight and mail tonnage also showed large increases. On the financial side, however, the account showed a deficit of £10,593, due to increased maintenance charges and salaries, and lower revenue caused by a smaller number of aircraft movements.

* * *

New Zealand and Canada have signed an air transport agreement granting reciprocal rights for the route between Auckland and Vancouver. Under an interim agreement, B.C.P.A. has operated on this route since 1947 and will now continue to do so as the "designated" airline for New Zealand. The Canadian Government has designated C.P.A. to fly into Auckland. The agreement does not confer rights for either airline to fly between Auckland and Sydney.

CLUB AND GLIDING NEWS



SEATING SIX : A promising light twin for the private or commercial owner is the Macchi MB. 320 which, following a mishap on its first flight, is now undergoing development trials. It is powered by two 185 h.p. Continentals.

NEXT Saturday, August 26th, the Wiltshire School of Flying is holding its annual air race and display at Thruxton airfield. The flying programme, which begins at 2.30 p.m., will include demonstrations by an Auster Autocrat, Magister, Harvard and Meteor; and a number of aerobatic, competition and novelty events will be added attractions.

Immediately after the tea interval the annual open handicap race will be flown over a 75-mile course from Thruxton to Totland Bay (I.o.W.) and back. Thirteen entries have been accepted as follows: T. Boughton (Tiger Moth), J. Bellamy (Auster Autocrat), Capt. Spencer Smith (Magister), D. J. Jemmett (Proctor), S/L. L. Cliffe (Auster), D. Ogilvy (Falcon), D. C. Jemmett (Hawk Trainer), P. Q. Reiss (Tiger Moth), J. N. Somers (Gemini), G. Forsaith (Moth Minor), A. S. K. Paine (Proctor), F. Bingham (Chrislea Ace), and Miss L. Curtiss (Foster-Wicko).

Thruxton airfield is located on the Amesbury Road some five miles from Andover. Further particulars may be obtained from the Wiltshire Flying Club (Weyhill 352 or 403).

* * *

THE London Gliding Club has added another Olympia to its fleet, and shortage of accommodation now makes it necessary to economize on hangar space by de-rigging some private owners' machines. Retrieving charges have recently been revised, and a basic charge of 10s per retrieve, plus 1s per air-mile (one way) is now being tried. Aero-tow facilities have been arranged with Elstree, and the possibility of obtaining a Link Trainer is being investigated.

* * *

Statistics for the National Gliding Contests show that 535 competition hours were flown for 286 launches, while 6,050 air-miles were covered during 104 cross-country flights of more than 10 miles, of which 31 were goal flights.

In view of the flying experience which must be available within the R.A.F., it was surprising that their teams did not gain higher placings. It is understood that one of the reasons for the relatively low total marks gained by the R.A.F. teams was the fact that their pilots had had insufficient recent practice under simulated competition conditions. The R.A.F. Gliding and Soaring Association is at present considering plans for reorganization before next season: the growth of the Association has thrown too much work on the central organization, and it is planned to decentralize as much as possible. If these plans are approved at the forthcoming general meeting, the Association will become the governing body for all R.A.F. gliding, and detailed liaison with clubs will be undertaken by Command representatives. The Association would thus become the Service equivalent of the B.G.A., on whose council the Association will continue to be represented.

One result of this reorganization may be seen next season in touring instructional facilities: the Association has in mind either hiring their two-seater to unit clubs for short periods, or providing a touring instructor. This system will take dual instruction to the clubs, and it is hoped to train a larger number of members than has been possible on the Association's courses at Detling.

* * *

The British Gliding Association has asked clubs to submit an estimate of the quantity of petrol to be consumed between April 5th and December 31st, 1950, so that the official scheme for refund of additional petrol tax may be further considered.

* * *

The U.K. local out-and-return gliding record for single-seaters, set up by J. A. C. Karran with a flight of approximately 141 miles on July 2nd, was homologated on July 14th; the exact distance is subject to further confirmation. The B.G.A. Council was unable to homologate W. A. H. Kahn's claim to the same record for a similar flight on the same day, as he landed 23 minutes after Karran.

* * *

In accordance with a recent ruling, U.K. local gliding records will in future be bound by the same regulations as national records, for which regulations are laid down by F.A.I. Potential record-breakers are reminded that, in order to have their records homologated, they must be in possession of a competitor's licence, which may be obtained free of charge from the B.G.A.

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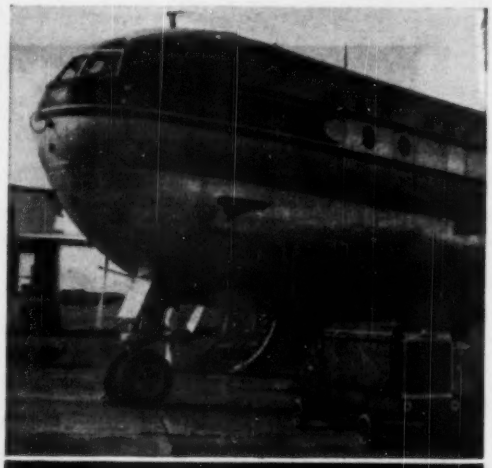

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For Servicing and Starting all types of aircraft, including jets

The above illustration shows the new Murex aircraft ground power unit starting the engines of a Boeing Stratocruiser at London Airport. This unit is designed to supply the electrical current for servicing and starting all types of aircraft including piston engine, turbo-jet and turbo-prop types. The unit has an engine driven generator and eliminates the use of heavy service accumulators. The standard unit supplies a current of 600 amperes continuously at 28.5 volts for servicing and a peak current of approximately 1,200 amperes for engine starting periods. Other capacities are available.

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POST-WAR AIR RACING

—*is Something Missing? A Pre-war Winner Asks Some Pertinent Questions*

By WINIFRED BROWN

AS something "rather different" in post-war air races, the *Daily Express* International South Coast Race on September 16th seems likely to be watched with interest, especially by "the forgotten pioneers of long ago"—in which category a South African magazine recently included me!

For some time we have been asking ourselves "What has gone wrong—air racing or we old pilots?" Has the sport really lost its thrill and popularity, or have we merely become the club bores who stand at a bar counter and say, between beers, "Things aren't what they were"? I have been thinking about these questions for several weeks—ever since, in fact, I set off, in excited anticipation and an Austin Seven—to see this year's King's Cup Race. The Wolverhampton Aero Club had very kindly invited me—"Just to show them you are still in the land of the living, Win," chuckled John Bill over the telephone, for the previous year the B.B.C. had coupled my name with the type of wings that go with a harp! It was 20 years since I had won the King's Cup and 19 years since I have even seen an air race. I had a shock coming to me!

THE author of this article, Miss Winifred Brown (now Mrs. Adams) is the only woman winner of the King's Cup. In 1930, flying an Avro Avian biplane (Cirrus III engine), she won the race at 102.7 m.p.h. Held over a 750-mile round-England course starting and finishing at Hanworth (near the present London Airport), and with compulsory 40-minute halts at four airfields, the event attracted no fewer than 101 entries, 88 of which started.

When asked if I were flying, I laughed and replied ungrammatically, "What, me! *I'm* used to 105 m.p.h., not 501." And as my little car proceeded at a sedate 40 m.p.h. my mind went back 20 years. Who would be there? Tommy Rose, Jimmy Jeffs, Robin Cazalet, "Lamps"? What fun it would be to see them all again!

On arrival at the Star and Garter I rushed to look at the hotel register . . . I didn't recognize a single name! They must still be in the bar . . . we had always lingered . . . they would come later; so, casting respectability to the wind, I ignored my married name and wrote "Win Brown and son."

That night there was a R.A.F.A. dance—to meet the "famous pilots"! The dancing was popular enough, but we were not; when we went on the stage the room practically emptied—the dancers had probably done far more flying than we had! Still there was a nice bar upstairs, and I talked with interest to the 1950 pilots. "Do you have flying pageants these days?" I asked a young man. For a moment he looked puzzled, then replied "Yes, but *we* call them 'air rallies.'" "When I flew in 1930 we had a 750-mile course. Do you like these short circuits?" "Oh yes! It's a better test of flying—none of this navigation stuff enters into it." I thought sadly of Bert Hinkler, Cobham, Banard, Hubert Broad and Wally Hope. That night I went to bed at 11.30—if there was a party I didn't find it!

Next day I got to the airfield early. I looked and blinked. Was I back in 1930? Where were these modern super aircraft? I felt I could have got into almost any one of the competing machines, and flown as I used to do; but my son, aged nine, was thrilled as I took him round. It was then the Press descended on us—"That's right, sonny—smile up at your grannie!" My expression was such that the pictures did not appear, but fortunately the bar tent opened and Jack Cantrill, who had given me my first flying lesson in 1925, assisted me to recover. Then a few old faces appeared, but we all sadly agreed that "things ain't wot they was."

"Flight" photograph

The author of this article after her 1930 victory.

As for the race itself—well, it sounded fine on the radio but, with no rudeness intended, I would not describe Hawk Trainers and Austers "screaming" round anything. Princess Margaret's Hurricane gave us a thrill and it was beautifully handled by Townsend, but the two Spits that I had relied on to impress my son promptly took off and got lost—so perhaps there is something in this "navigation stuff" after all! One we never saw again, but the other obligingly returned, much to the delight of my small son, and the spectators—but probably less so to the owner of the aircraft whose tail it knocked clean off.

But what horrifies me about this race—and, for that matter, present-day air racing in general—is that the slide-rule experts, secreted with Charles Gardiner in glass towers, seem reasonably able to forecast the result after one lap! In the King's Cup they were about 60 yards out, and in the two Newcastle races a few weeks later it seems from *Flight's* report that the ultimate winners appeared unbeatable almost from the outset.

Where is the sport, the fight, the fun of the thing?

It seems to me that if you haven't beaten the handicappers before you start you might just as well stay in the bar. On a long circuit a race was never lost until it was won. Engines could pack up in sight of home; flimsy racing wheels could buckle on a careless landing; you might run into cloud or fog and fail to find that white cross in the field; but no matter what happened there was always home—the others might be faring worse. To beat the handicappers was a decided help, but only the beginning of a long story.

After this year's King's Cup I scanned the newspapers, but gone were the old headlines. The little publicity there was went to the tragic accident rather than to Edward Day. I wondered vaguely if a victory for Princess Margaret would have received more publicity, but I doubt it—my papers were full of the footballers who received a free trip to South America, £25 each and the offer of some £175 a month, and returned highly incensed because a hair-cut cost 7s and the people carried rifles! So good for British prestige, and obviously so much more important than a few men and women who risk their necks for British

POST-WAR AIR RACING : : :

aviation, a possible prize of £150 and a replica of the Cup. I did risk my neck for about £1,000 in 1930, and in those days the cup was won outright.

What has caused this lack of interest on the part of the Press and public? Has flying become too common? But, for that matter, what could be more common than football and race-horses, sports which still hold the crowds? Perhaps it is the effect of the war—petrol only just off the ration, money short, private owners and aero clubs unable to afford the high-powered aircraft we now scarcely glance at as they do, literally, scream through the sky.

Presumably with the industry in a transition stage pending large-scale production of military jet aircraft, and because of present-day economic conditions, the trade cannot give the support it did to racing. For this reason one must admire the present-day private owner. Gone are the days of dual at £1 an hour, free petrol, a loaned engine, and perhaps even a free aircraft. To-day one can hardly afford to patronize the bar tent!

My small son was all for presenting the King's Cup to Cole and his Comper Swift. "That little one has done best, Win—it has gone all that way against the big ones." Out of the mouths of babes and sucklings. . . .

Would the old Circuit of Britain again arouse public interest? Personally, I think it would. Some 15,000 people were present at Wolverhampton this year, but in 1930 similar, if not larger, crowds assembled at each of the controls at London, Bristol, Manchester, Newcastle and Hull, not to mention the turning-points at Southampton, Birmingham, Liverpool, Leeds and Leicester. The King's Cup race belonged to the country as a whole and not just to one area.

But there is another point, and an important one. The rot started to set in way back in 1931, when new King's Cup regulations caused the entries to drop from 101 to 41. Restrictions! They are ruining our country to-day.

It seems to be that the South Coast Race is, in some degree, a return to old conditions, and that if it is successful it may influence next year's King's Cup. I hope so, for personally I would like to see a grand and glorious free-for all—Maggies to Meteors on the old circuit of Britain. "What else would you do, Win?" asked one of the old-timers as we stood discussing the matter in the bar. "I'd have bookies under nice, coloured umbrellas—but I'd keep them away from the slide-rule experts!" "And I suppose you'd have better prizes and bigger bar tents?" "Sure!" I laughed. "Well," said an old pilot, slowly, "something has got to be done; the King's Cup to-day is no different to the little races we used to take part in every Saturday at the old pageants." "Rallies, dear, rallies," I corrected. So we all had another beer, and my small son, waiting outside, began to take a dim view of aviation.

THE BLACKBURN DISPUTE

THOUGH there were further developments last week in the Blackburn and General Aircraft dispute, it seem unlikely that the air will be cleared until an extra-ordinary general meeting of shareholders is held on September 7th. The whole future of the enterprise may then be decided. At present the company has no production orders, either for the Freighter, the YA5 or for any other types. Mr. Robert Blackburn, the chairman, said in a recent circular to shareholders that no proposal for liquidation would be made unless it was apparent that in fairness to them such a course could not be avoided.

Following the dismissal, last month, of two directors, Mr. H. V. Gort and Capt. Norman Blackburn, charges and counter-charges have been made by both sides. Last week Hanworth Securities (formerly General Aircraft, Ltd.), who hold 21¼ per cent of the shares in the merged company, issued a long statement reviewing events leading up to the dismissal of the two directors. In this it is alleged, *inter alia*, that:—

"The chairman and directors of Blackburns have throughout failed to give the managing directors their confidence and support, which is essential to the efficient conduct of the company's affairs. In particular they have placed obstructions in their way and withheld information from them which was necessary for the proper carrying out of their duties.

"The chairman raised without notice the major proposal to consider the liquidation of the company, and failed to ensure any reasoned discussion of his proposal by the Board.

"On these grounds," adds the circular, "we have come to the conclusion that it is essential for the proper conduct of the affairs of Blackburns that the resolutions removing from their office the chairman and four other directors responsible for the present state of affairs should be accepted and passed by the shareholders."

The two dismissed directors also issued a detailed statement, the conclusions of which read as follows:—

"To sum up, we submit that shareholders will agree that there was no justification for our dismissal.

"(1) Without any prior notice we were suddenly confronted on June 29 with the proposal that 'serious and quick' consideration be given to putting the company into voluntary liquidation.

"(2) As managing directors we did treat this proposal 'seriously and quickly' and, therefore, arranged an early Board meeting and circulated in advance our views on this proposal.

"(3) At this Board meeting our views were rejected, and in the space of a few minutes we were dismissed.

"(4) The other five directors did not attempt to make out a case in support of their proposal.

"We feel that we should give some indication of our views on the company's present position. Your company has, like other companies in this industry, suffered from cancellations and reductions in aircraft contracts during the past 18 months. Nevertheless, we consider that the necessary economies can be effected so that the business can be carried on successfully."

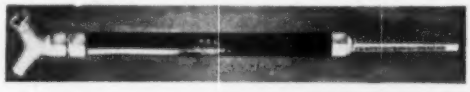
Mr. Robert Blackburn, chairman of Blackburn and General Aircraft, had already issued his own statement, in which he complained that shareholders were being invited to hand over the management of the company to Hanworth Securities, which acquired its whole shareholding since 1948. He gave as his reason for the dismissal of Capt. Blackburn and Mr. Gort the fact that they "declined to make a full report to the board on the steps which should be taken to avoid current and prospective losses."

The chairman issued a warning that the accounts for the year ended March 31st last would show a trading profit of not more than one-third of the £462,000 earned in the previous year, though fortunately provisions no longer required, amounting to £500,000, would be available. For some months both the Brough and Dumbarton works had been running at a loss, and the results for the year ending March next were likely to be discouraging.

Mr. Blackburn concluded with the statement referred to above—that liquidation would not be proposed unless it seemed unavoidable. He pointed out, however, that the assets were worth considerably more than the nominal amount of the share capital and that the surplus built up over a generation must not be frittered away in meeting a period of trading losses.

DUAL-HEAD TYRE GAUGE

STATED to have received prolonged service trials on over 30 different types of aircraft before production, the new P.C.L. tyre-pressure gauge has been officially accepted by the Air Ministry. The principal feature is the use of two heads, one to fit the giant-tyre inflator valve (0.482in dia.) and the other to suit the standard 0.305in valve. Calibration is from 24 to 176 lb/sq in, and it is stated to be accurate to within 1 per cent. Overall length of the gauge is 11½in. The makers are Pneumatic Components, Ltd., Eyre Street, Sheffield, 1.



The P.C.L. tyre-pressure gauge, showing the dual gauging heads.

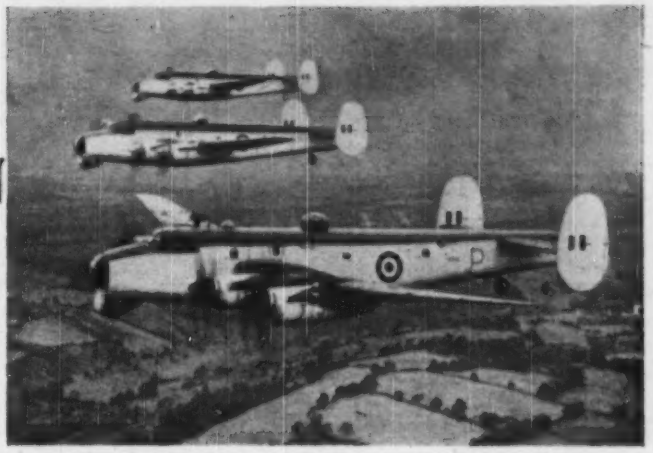
A NEW NIMONIC ALLOY

ALTHOUGH it has been used for some time past in many gas turbines, it is only now permissible to mention the existence of Nimonic 90, one of the series of high-performance nickel alloys evolved in the laboratories of the Mond Nickel Co., Ltd., and produced in the rolling mills of Henry Wiggin and Co., Ltd.

Even now, little detailed information has been made available, other than that at a temperature of 750 deg C the load-carrying capacity of blades made of the new material is some 10 per cent higher than that of blades made of the existing Nimonic 80A. Even at operating temperatures as high as 870 deg C the new alloy is said to maintain its characteristics to a remarkable degree.

SERVICE AVIATION

Royal Air Force and Naval Aviation News and Announcements



ANTICIPATION : Flying prototype and first-production Shackletons, three Avro test-pilots provide a "preview" formation for Coastal Command squadrons—shortly to take delivery of these Rolls-Royce Griffon-powered reconnaissance aircraft.

R.A.F. Flying Pay

IT is reported that flying pay for R.A.F. aircrew will shortly be re-introduced, as part of the increased Services' allowances to be announced by the Prime Minister. Flying pay, as such, has not been made to R.A.F. officers since 1919.

W.R.A.F. Aide-de-Camp

AIR COMMANDANT N. M. SALMON, O.B.E., has been appointed an Honorary Aide-de-Camp to the King, in succession to Air Commandant Dame F. Hanbury, whom she succeeds as Director of the Women's Royal Air Force.

Chaplains Wanted

MORE Church of England chaplains are wanted to fill the considerable number of vacancies that now exist in the R.A.F. There is no age limit for chaplains on entry, but normally on first appointment they will be about the age of 28 years. A candidate for appointment as a chaplain of the Church of England must, as a general rule, have been three years in priest's orders, and must obtain a written commendation from his Bishop, to be sent to the Chaplain-in-Chief. More detailed information is contained in a pamphlet which may be obtained from the Chaplain-in-Chief, Air Ministry, 33, Draycott Place, London, S.W.3.

Middle-East Vampires

AN exchange of emblems between King Abdullah of the Hashemite Kingdom of the Jordan and No. 6 Squadron, R.A.F., took place recently at the end of a four-week desert training exercise undertaken by the Squadron at R.A.F. Station Mafraq, 45 miles from Amman. The Squadron presented the King with a framed reproduction of their crest in gold and silver brocade, the crown studded with jewels, on a white satin background. King Abdullah, who is an honorary Air Commodore in the R.A.F., is to present the Squadron with one of his personal banners. While in the officers' mess tent on a visit to the airfield, the King autographed a photograph of himself taken on a wartime visit to the Squadron.

No. 6 Squadron, which is equipped with Vampire 5 fighter-bombers, is based in the Canal Zone of Egypt; the object of the exercise was to assess problems arising from the operation of jet aircraft from desert airfields. The surface of the airfield at Mafraq consists more of fine powdery dust than of sand. The Squadron lived under canvas, and the exercise was undertaken with enthusiasm and completed with success. The training programme included air-to-ground firing, night flying, bombing exercises and rocket-firing practice.

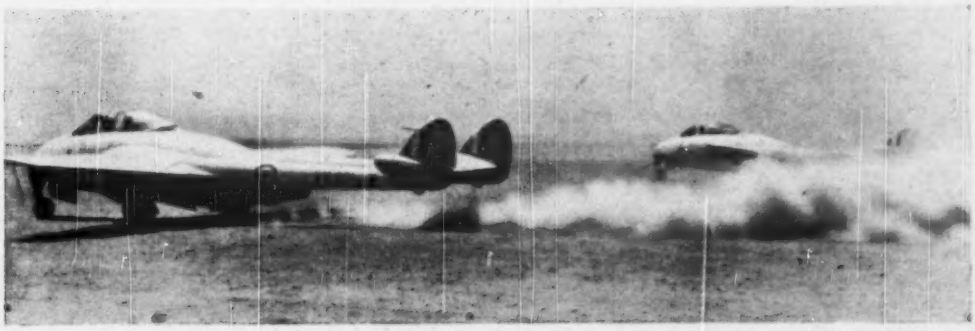
Servicing parties for the Vampires flew to Mafraq in Valetta transports. They were accompanied by men of No. 61 Rifle Squadron, R.A.F. Regiment, who carried out ground exercises and performed airfield guard duties while in Jordan. Air Marshal Sir John W. Baker, K.C.B., M.C., D.F.C., Commander-in-Chief, Middle East Air Force, visited the Squadron at Mafraq.

For Service in Malaya

THE KING has approved the following appointments and awards to members of the R.A.F. for distinguished service in Malaya during the period from December 1st, 1949, to May 31st, 1950. Brief extracts from citations are given in each case.

K.B.E.

A.V.-M. F. J. W. Mellersh, C.B.E., A.F.C., has commanded the Air Force employed in the Malayan campaign with skill and determination. Due to his leadership, enthusiasm and active participation in a number of sorties, the



SAND-STORM : Vampire 5 fighter-bombers of No. 6 Squadron (mentioned in the paragraph above) take off from the desert at Mafraq.

SERVICE AVIATION . . .

R.A.F. has played, and is continuing to play, a very important part in this difficult campaign.

C.B.E.

G/C. P. H. Dunn, D.F.C., the Senior Air Staff Officer in Malaya, has carried the lion's share in the preparation of the Air Defence Plan for Malaya, Singapore, North Borneo and Sarawak. . . . In addition to his staff work has taken part in numerous operations.

O.B.E.

W/C. R. L. Bloodworth, Chief Technical Officer at Changi since August, 1947, has been responsible for the maintenance of a large number of different types of aircraft, and, under all the difficulties of tropical conditions, has discharged this responsibility with outstanding success.

S/L. H. J. R. Hailstone, Chief Technical Officer on the Technical Wing of H.Q. Staff, has shown intense devotion to duty and unstinting and conscientious effort at all times.

M.B.E.

F/L. A. W. J. Enstone, of No. 94 Squadron, R.A.F. Regiment, volunteered for attachment to the Suffolk Regiment to gain knowledge of jungle fighting. On returning to his squadron he passed on the information, which has since proved invaluable . . . He has led his men with courage and skill.

W/O. G. E. Allman was, until May 1st, in charge of the photographic section at Kuala Lumpur. By his cheerfulness and willingness to work at all times, he has ensured that the section has been able to meet excessive demands for photographs, despite primitive equipment.

D.F.C.

F/L. R. Cox of No. 110 Squadron has flown 331 hours on Malayan supply-dropping operations. Dropping-zones are usually minute in size and situated in mountainous country; it is necessary to fly at tree-top height to effect an accurate drop, resulting in many cases in an awkward and dangerous climb-away. In carrying out these duties F/L. Cox has been outstanding.

F/L. G. W. Hill has flown 65 hours to make 51 strikes against terrorists in the jungle. As a deputy flight commander of No. 33 Squadron, he has at all times proved to be outstanding as a leader and is an example to all pilots in the squadron.

B.E.M.

F/S. R. E. S. O'Nion has taken a very active part in the maintenance and servicing of the 10 Sunderlands of the Far East Flying Boat Wing. By his abnormal stamina and ability to work long hours he has encouraged those under him to do likewise.

Sgt. R. Pearson has been a member of No. 33 Squadron for three years and volunteered for overseas service to accompany it from B.A.F.O. to the Far East. The Squadron has carried out much valuable work in Malaya and its serviceability and operational efficiency owe much to the work of Sgt. Pearson.

F/S. T. A. Peters has serviced the aircraft of No. 60 Squadron most efficiently, particularly since operations against the insurgents have been intensified. The Spitfire 18s with which the Squadron is equipped are obsolescent and many of them are old and have deteriorated considerably. The degree of serviceability achieved under these conditions is a remarkable tribute to the servicing personnel.

Sgt. P. Townsend is a fitter IIE in the Aircraft Repair Squadron, which works, in direct support of operations, on the erection and preparation of reinforcement aircraft and on the salvage, repair and overhaul of aircraft used by front-line units. He has carried increased responsibilities and worked for long hours in a cheerful spirit of service.

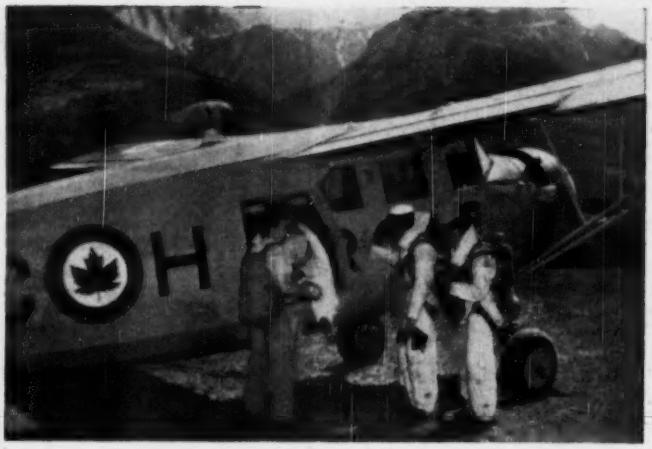
Cpl. F. Tandy, of the Armament Section at Tengah, has in several cases designed and manufactured tools which have materially reduced the time taken to prepare bomb-loads for aircraft, and this has allowed a greater strength of strike aircraft to be despatched.

A/Cr. C. R. Mearns, a regular airman in the accounts section at Kuala Lumpur, has shown the greatest enthusiasm. In a small section of two hard-pressed N.C.O.s he has had little supervision but the volume and accuracy of his work have been of a high order.

Mention in Despatches

The following have been mentioned in despatches:—

Wing Commanders L. H. Baker, R. J. Burrough, D.F.C., F. G. Carle, O.B.E., J. M. N. Pike, D.S.O., D.F.C.; Squadron Leaders V. H. Dean, R. A. Harpum, B.E.M.; Flight Lieutenants B. F. Knightley, J. H. Maguire, A. W. Paterson, A. I. Thompson; Flying Officers R. H. Levisteur, E. F. J. Yeo; W/O. J. H. Pickrell; Flight Sergeants G. Glover, F. H. Hanley, C. D. Williams; Sergeants J. Clayton, E. Johnson, S. T. Shoebrooks; Corporals S. P. Anderson, D. J. Donnelly, R. G. Farmer, Mohd bin Hussain, I. J. Irwin, D. E. Johnson, R. A. Scoulding (W.R.A.F.), E. Simpson, B. A. Stapleton, F. Trotter (W.R.A.F.), Abdul Aziz bin Mohd Said.



ROCKY-MOUNTAIN RESCUERS: Atmosphere abounds in this scene from the R.C.A.F.'s Para-Rescue School near Jasper, in the Rockies. Medical personnel, fully equipped, are about to embark in a Norseman bush transport for a practice jump.

A.T.C. at White Waltham

SOME 300 A.T.C. cadets from all parts of the country began a four-day camp at White Waltham, the Headquarters of Home Command, on August 10th. The camp concluded with a demonstration, last Saturday, of the cadets' work. It was attended by the Under-Secretary of State for Air, members of the Air Council and foreign air attachés.

Among the events were a gliding display, formation-flying by radio-controlled models, performances by two A.T.C. bands (those of No. 65 and 66 Groups, representing London and Scotland respectively) and a demonstration of the work of an A.T.C. Mountain Rescue Unit.

Last Monday, the third A.T.C. Flying Scholarship Selection Board was held at White Waltham. It was attended by about 100 nominated members of the A.T.C. and R.A.F. Section of the Combined Cadet Force, representing each of the seven groups in Home Command. The board was presided over by A.V-M. G. S. Hodson and the other members were G/C. E. M. Donaldson and W/C. G. J. Rayner.

Candidates for flying scholarships must possess the A.T.C. Proficiency certificate. They are encouraged to complete their course in a continuous period and must attend for at least two consecutive weeks.

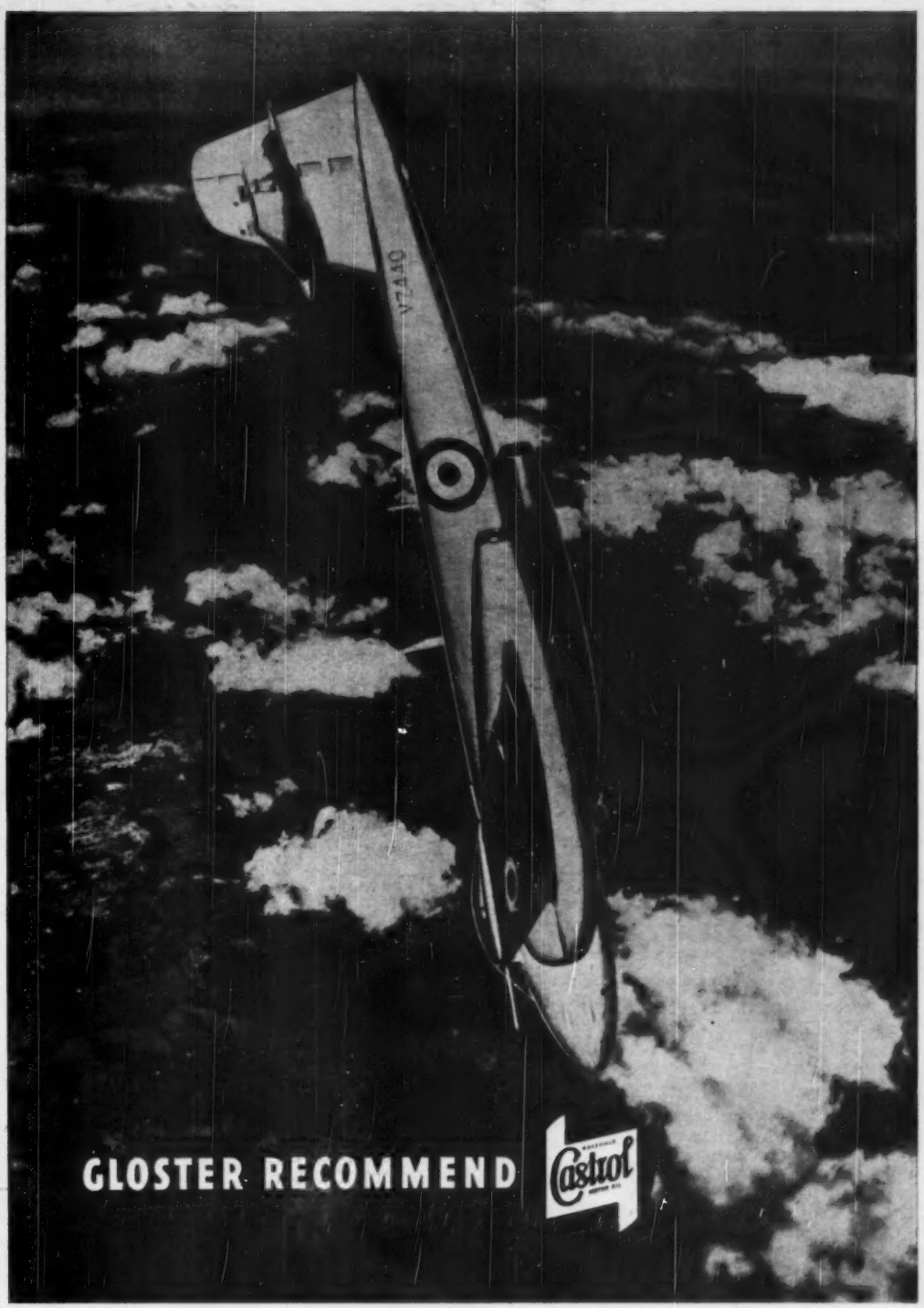
Flying instruction is given at civil flying clubs near the cadets' homes at Government expense and the scholarships are worth about £150. When they pass their test at the end of the course they are granted Private Pilots' Licences.

Reunions

NO. 219 Squadron.—Fourth annual reunion dinner (also for former members of 6219 and 6029 Servicing Echelons who served with 219 Squadron) at the Clarendon Restaurant, Hammersmith Broadway, London, on Saturday, September 30th. Tickets £1 12 from S/L. D. W. B. Farrar, Officers' Mess, R.A.F., Church Fenton, Yorkshire.

* * *

NO. 2 (M.E.) A.D.U.—Fourth annual reunion for officers and senior N.C.O.'s at the Grosvenor Hotel, Deansgate, Manchester, on Saturday, October 7th, at 7 p.m. Details from H. H. Wynn, University Union, Manchester, 15.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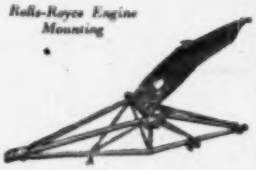

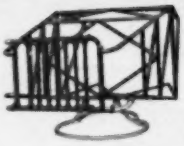

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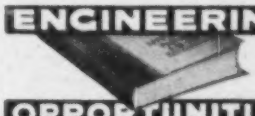

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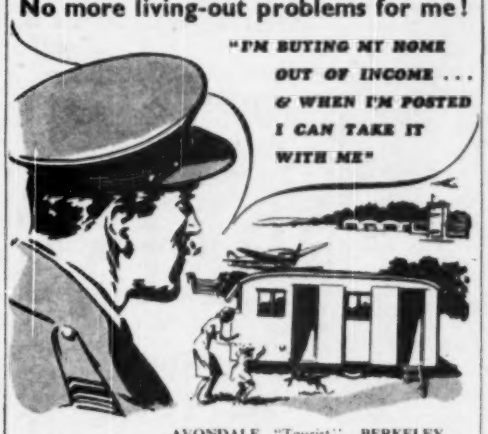

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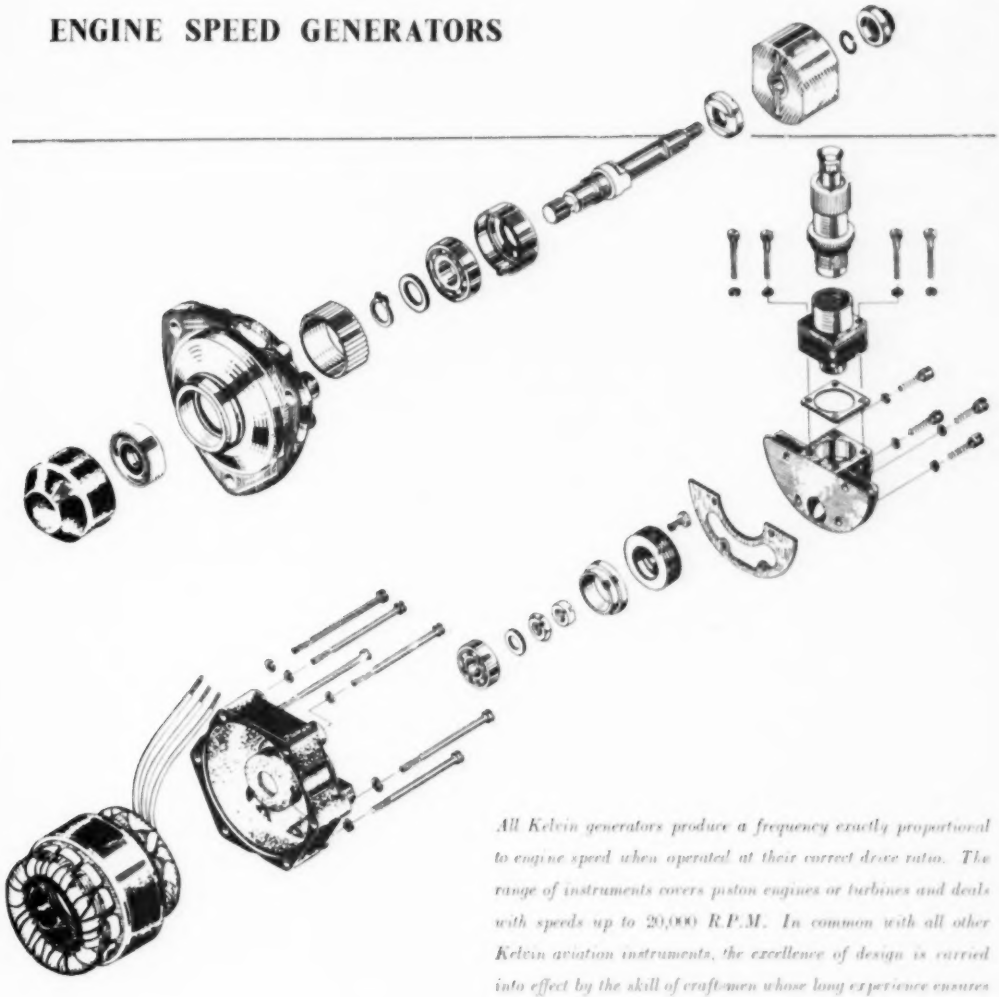

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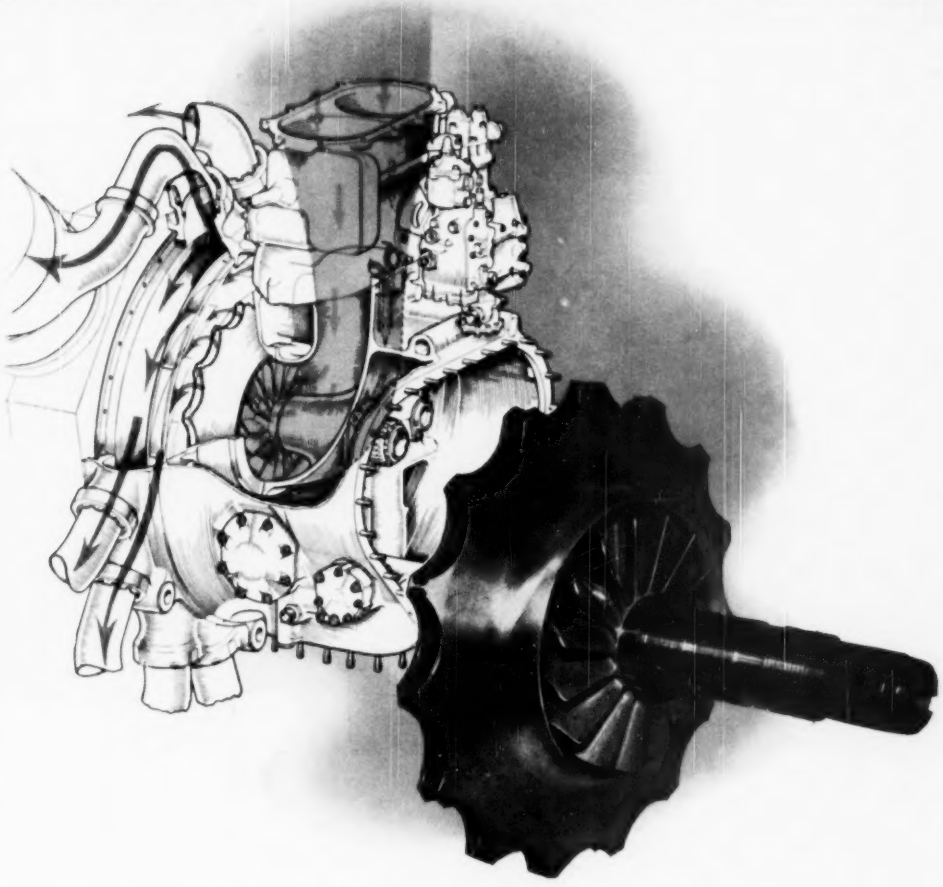

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